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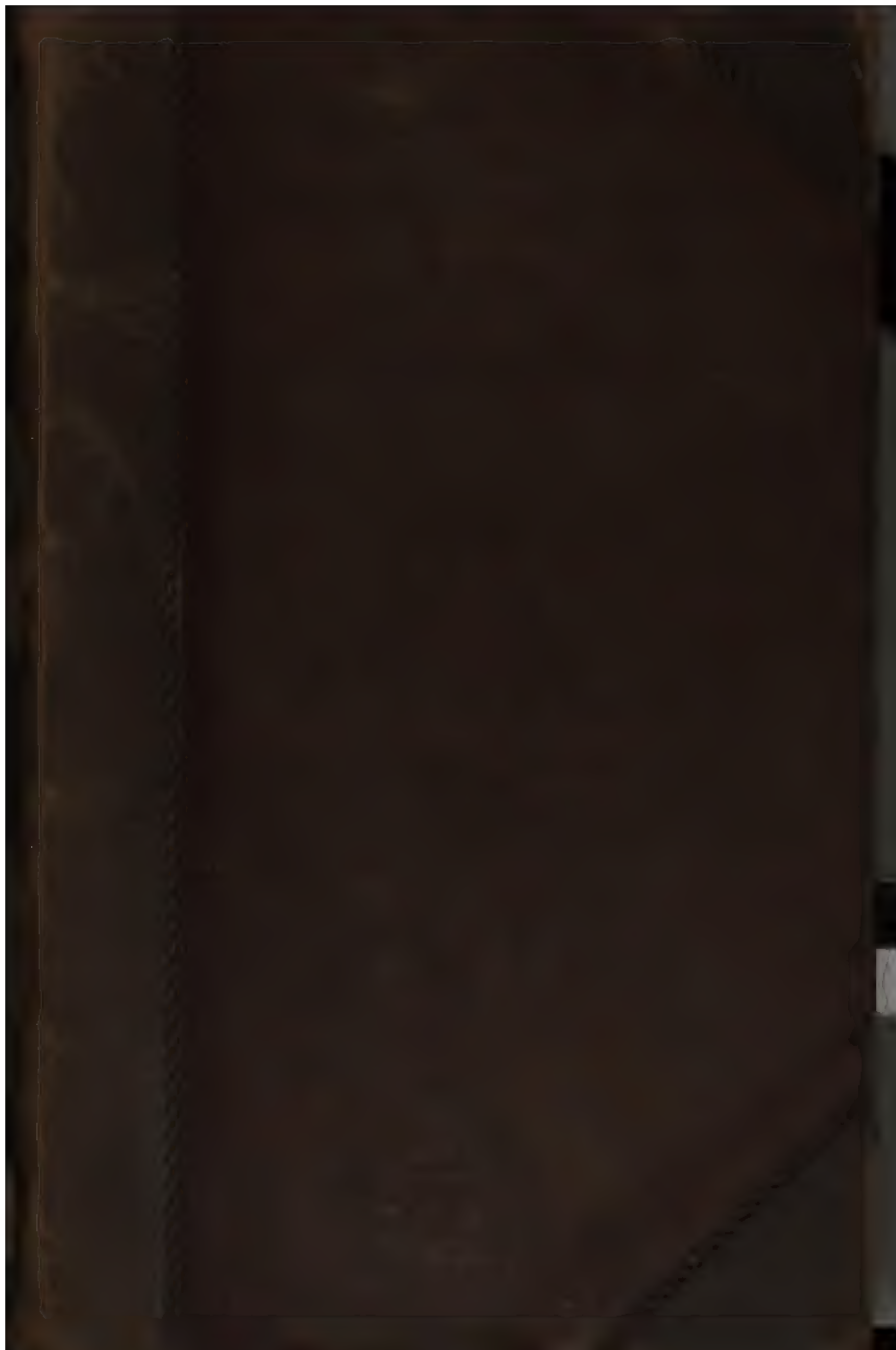
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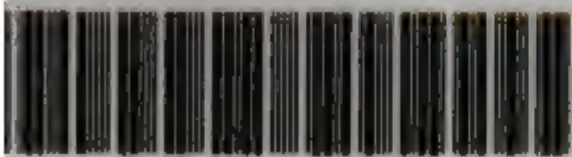
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GENERAL REPORT
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AGRICULTURAL STATE, AND POLITICAL
CIRCUMSTANCES,
OF
SCOTLAND.

GENERAL REPORT

OF THE

AGRICULTURAL STATE, AND POLITICAL
CIRCUMSTANCES,

OF

SCOTLAND.

DRAWN UP FOR THE CONSIDERATION OF THE BOARD OF
AGRICULTURE AND INTERNAL IMPROVEMENT,

UNDER THE DIRECTIONS OF

THE RIGHT HON. SIR JOHN SINCLAIR, BART.

THE PRESIDENT.

VOL. III.

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GENERAL REPORT

OF THE

AGRICULTURAL STATE, AND POLITICAL
CIRCUMSTANCES

OF

SCOTLAND.

CHAP. XIV.

ON LIVE-STOCK.

BY MR WILLIAM AITON AND OTHERS.

PRELIMINARY REMARKS ON THE LIVE-STOCK
OF SCOTLAND.

IN the first chapter of this work, it is stated that Scotland contains about nineteen millions and a half of English acres; of which the cultivated land, and that which is under woods and plantations, extend to little more than one-fourth, or five millions. Even upon the arable land, corn crops cannot be cultivated with advantage but at certain intervals. In the best districts, there will generally be not less than one half of the land employed in raising roots and green crops for live-stock, and more than two-thirds of the inferior soils are always under these crops and in pasturage. Proba-

bly not more than two-fifths of even the arable land, or ten acres in a hundred of the whole surface, produce crops immediately applicable to the food of man. The remaining ninety acres, after a small deduction for fresh-water lakes, are appropriated to the breeding, rearing, and fattening of live-stock.

It is proposed in this chapter to describe the breeds of the several species of live-stock, and to present a concise view of their management and produce,—but of such animals only as have been domesticated, and belong to the husbandry of the country.

Live-stock, considered in this point of view, may be said to be the instrument which the husbandman employs for converting to the use of man those productions of the soil which are not immediately applicable to the supply of his wants in their natural state. The great importance of this instrument in the husbandry of Scotland, and the extent to which it must be applied, may be perceived from considering the small proportion of its surface which can be rendered available by any other means to the subsistence and comfort of its inhabitants. Accordingly live-stock has long been the staple commodity of the country.

Before treating of each species separately, it may be proper to offer a few remarks on the live-stock of Scotland in general, which the reader may keep in view when perusing the subsequent divisions of the chapter, and which will preclude the necessity of repetitions under each head.

It is proposed to consider,

- I. The several species and varieties of the inferior animals in connection with the food appropriated to their maintenance.
- II. The most desirable properties of live-stock, with the means of improvement, and the circumstances upon which that improvement depends.
- And III. To mention some of the rules which are generally observed in their breeding and management.

I. With regard to the *first* of these, the surface of Scotland may be divided into three descriptions of land, according to its capability of producing a supply of winter food.

1. In so high a latitude, and in a country so mountainous, it is of the first importance to provide food for live-stock during the long period of winter; and where this provision cannot be secured by human labour, such a description of stock should be preferred as are able to subsist upon the coarse and scanty remains of the summer-herbage, to travel and toil for it themselves, and to endure the rigours of a cold, stormy and variable atmosphere. As cattle are in none of these respects so hardy as sheep, those districts which do not afford a supply of winter food have been very properly stocked with sheep; and such food as the soil produces, is found to be convertible into a much greater quantity of mutton than of beef, besides the value of the wool. It is on these grounds that sheep have been introduced into the Highlands of Scotland; and however much some of the consequences may be regretted, it is impossible to deny, that by augmenting the produce of human food, and increasing the material of our staple manufacture, the change has been in these respects beneficial to the nation, and, by thus advancing the value of the land, greatly for the interest of the proprietors.

2. A second division of the surface of Scotland may comprise that portion which, though generally too hilly, rugged and barren, and in too unfavourable a climate for aration, yet contains a small proportion of land of a better description, upon which hay and winter crops may be produced. In this situation, several kinds and varieties of live-stock may be kept, and one or other in greater numbers, according to circumstances. There are found accordingly upon this large division, the valuable breeds of Argyleshire and Galloway cattle, and a great many local varieties produced by crosses with these, and with foreign breeds; and also, besides the mountain and Cheviot breeds of sheep, a few of almost every native and crossed breed in the island.

3. The remaining part of Scotland includes the land under regular rotations of tillage crops, and also such land as, though retained in grass, may produce corn and green crops with advantage at certain intervals. It is only in this division, where there is an ample provision of winter food, that the larger breeds of cattle and sheep can be kept, or a new breed formed by skilful management. For the reasons that shall be afterwards assigned, breeding has been less an object of attention in Scotland, even on land of this description, than it has been in England; and though almost all the best breeds of cattle and sheep have been introduced and established, the only one that can be said to have been formed is the dairy breed of Ayrshire.

Over all the two first divisions, the primary object must ever be, to improve the productions of the soil,—to provide food in greater abundance and of a better quality, and also shelter by means of plantations,—as a necessary prelude to the improvement of the live-stock, in so far at least as respects the increase of beef and mutton. Every attempt at enlarging the size of an animal, though conducted according to the most approved principles of breeding, must prove abortive and even injurious, unless it is supported by a more ample provision of food, particularly during the winter season.

Upon arable land, or rich pastures under a mild climate, this state of things is completely reversed.

A correct system of agriculture necessarily includes the production of food for the domesticated animals, as well as for man; for without grass, turnips, and other cattle crops, the fertility of the soil for producing grain could not be preserved. Here then is a stock of the most valuable materials always at command; and the object is to employ such animals for consuming them as will make the greatest returns in meat, wool, and other produce, according to the demand for all or any of these articles; or, in the words of the celebrated Bakewell, “the best means of converting them into money.”

II. The desirable properties of live-stock must be estimated, 1. According to the food provided for them; and, 2. The purposes to which they are applied.

The great object of the husbandman, in every case, is to obtain the most valuable returns from his raw produce; to prefer that kind of live-stock, and that breed of any kind, which will pay him best for the food the animal consumes. The value to which the animal itself may be ultimately brought, is quite a distinct and inferior consideration.

§ 1. The size, form, and general properties of the inferior animals in a state of nature, may be always traced to the influence of soil and climate. Abundance of food, though of a coarse quality, will produce an enlargement of *size* in an animal that has been compelled to travel much for a scanty supply. *Early maturity* is also promoted by the same abundance; and if the food is of a better quality, and obtained without fatigue, a *tendency to fatten at an early age* will be gradually superinduced, and combined with a tameness and docility of temper, a general improvement of form, and a diminished proportion of offal; but at the same time such animals will not be capable of enduring the fatigue and privations, to which the less fortunate natives of the mountains of Scotland and Wales are habituated from their earliest infancy.

1. One of the most desirable properties of live-stock, for districts producing only a very scanty supply of food for winter, is *hardiness of constitution*.

The barren and mountainous surface, and rigorous climate, of the greater part of Scotland, not only prohibit any considerable improvement in the quantity and quality of its produce, but at the same time prescribe to the husbandman, the kind of stock which he must employ for consuming that produce. His cattle and sheep must be in a great measure the creatures of his own mountains and of his own climate. He cannot avail himself of the scientific principles which have

so eminently improved the live-stock of the rich pastures of England. The most esteemed breeds of the south, instead of returning a greater quantity of meat for their food, could not subsist at all upon the mountains of the north. The first object of the Highland farmer is to select animals that will live and thrive upon his pastures. Of two breeds nearly equally hardy, he will no doubt prefer the cattle that will give the most valuable carcase, and the sheep that will return the most money in wool and carcase. He has seldom any considerable extent of land that would fatten any breed; and if he had, there is no market for it within his reach. With his live-stock, as with his crops, he must be determined by his situation; and he would judge very ill, if he should lay aside his oats and big for the more valuable but precarious crops of wheat and barley.

2. *Early maturity* is a most valuable property in all sorts of live-stock. With regard to those animals which are fed for their carcase, it is of peculiar importance that they should become fat at an early age, because they not only sooner return the price of their food with the profits of the feeder, but in general also, a greater value for their consumption than slow feeding animals. A propensity to fatten at an early age is a sure proof that an animal will fatten speedily at any after period of its life.

This property, however, cannot be communicated to several of the Scottish breeds of cattle and sheep while upon their native pastures, because it depends in a great measure upon the quantity and quality of their food. When they are carried to better pastures, most of them are much esteemed for their aptitude to fatten speedily upon food which would scarcely keep alive other animals.

3. *Tameness and docility of temper* are desirable properties in most of the domesticated animals. These are also in some degree incompatible with the character of the live-stock of the mountainous districts of Scotland, merely because they are necessarily subjected to a very slight degree of domesti-

cation, and must search for their food over a great extent of country. When they are reared in more favourable situations, plentifully supplied with food, and more frequently under the superintendence of man, their native wildness is in a great measure subdued. The same treatment which induces early maturity will gradually effect this change.

4. The comparative value of two animals of equal weight destined to be the food of man, depends upon the *quality of their flesh, the proportion which the fine and coarse parts bear to each other, and the weight of both to that of the offals*. The first of these properties seems to be determined by the breed and food; the second by the form and proportions of the animal; and the third by all these and its degree of fatness. The flesh of well-formed small animals, such as the Highland breeds, both of cattle and sheep, is well known to be finer grained, of a better flavour, more intermixed with fat, and to afford a richer gravy than that of large animals, and it brings a higher price accordingly in all the principal markets of the island.

§ 2. The desirable properties of animals are different, according to the purposes to which they are applied.

The principal productions of live-stock are meat, milk, labour and wool. A breed of cattle equally well adapted to the butcher, the dairy maid, and the plough or cart, is nowhere to be found in Scotland, and probably no such breed exists any where. So far as experience enables us to judge, these properties appear to be inconsistent with one another, and to belong to animals of different forms and proportions. It must be evident, that a description of a well-formed animal for fattening will not apply to any of the different varieties of horses. And with regard to sheep, there is reason to suspect that very fine wool cannot be produced by such as have the greatest propensity to fatten, and will return the most meat for the food they consume.

In Scotland, the chief object of the breeder of cattle and sheep is their carcase. If a demand for dairy produce,—for the labour of oxen,—or for fine wool, should hereafter make it his interest to give a preference to any of these commodities, the form and proportions which he studies to obtain, with a view to the greatest produce of animal food, may probably require to be somewhat varied. In the meantime, it is only necessary in this place, to notice the shapes which indicate a propensity to fatten in the shortest time, and with the least consumption of food, and to lay the fat on the most valuable parts of the carcase.

The *head*—should be fine, clean and small.

The *collar*—full at the breast and shoulders, and tapering gradually to where the neck and head join.

The *breast*—broad, and well advanced before the legs.

The *shoulders*—wide and full, joining to the collar forward, and the chine backward, so as to leave no hollow in either place.

The *back*,—from the shoulders to the tail, broad, flat, and nearly level.

The *chest*,—full and deep; the ribs rising from the back in a circular form.

The breadth of the back, and circular form of a deep chest, are always considered as essential requisites. A flat-ribbed chest, however deep, and large bones, are invariably marks of a slow feeding animal.

A good judge of cattle, by a slight touch of the fingers, knows immediately whether an animal will readily make fat or not, and in which part it will be the fattest. The sensation is different from that of softness, being mellow and kindly. This skill, however, is only to be acquired by practice, and the feeling can scarcely be expressed in words.

There are several other indications of a propensity to fatten, which, though perhaps not strictly essential, are yet very generally found to accompany it; such as thin ears, hides and pelts, and small, fine and straight bones in the legs. Horns

are to be chiefly regarded as a criterion for distinguishing one breed from another.

A variety of minor circumstances are attended to by skilful breeders, in selecting animals for propagating, to which an unexperienced spectator would attach no importance whatever.

§ 3. With regard to the means of improving the carcase of any breed of live-stock, and the circumstances upon which that improvement depends, it may be observed, that the object ought to be, to improve the form rather than to enlarge the size. Size must ever be determined by the abundance or scarcity of food, and every attempt to enlarge it beyond that standard must prove unsuccessful, and, for a time, destructive to the thriving of the animals, and the interest of their owners. It is certain that animals, too large or too small, will alike approach to that profitable size which is best adapted to their pastures; but the large animal becomes unhealthy, and degenerates in form, and in all its valuable properties; whereas the small one, while it increases in size, improves in every respect.

It is for this reason, that crossing with large animals has been found so injurious in the Highlands of Scotland, and is so generally reprobated in the County Reports. The first object seems to have been, to enlarge the size of cattle for the purpose of labour. With this view, the cattle of Aberdeenshire were crossed with the Fife breed, and the largest cattle of the county are said to have been derived from this cross. But, though their size has been supported by the subsequent improvements of the soil, the most judicious breeders of that and the contiguous counties now prefer the native stock, which has been raised to a profitable weight, by selection and better feeding. The same enlargement of size has been effected, by the same means, in the southern islands of the Hebrides, in Argyleshire, Galloway, and other districts,

and it has been accompanied with a corresponding improvement in form, and in every valuable property.

Though the form does not appear to be so entirely dependent as the size, on the abundance or scarcity of food, it is very intimately connected with it. An animal that has been stunted in its growth when young, is never afterwards of a good shape, or well proportioned, however excellent the breed may be to which it belongs. Many of the cattle of the Northern Highlands and Isles of Scotland have all the characteristics of starvings, and are a very unprofitable race. Yet the cattle of the Western Highlands and several of the Islands are not better treated, at least in winter, and still retain their superior shapes, so much so, indeed, that the Skye and Argyleshire cattle have been resorted to, as the best means of improving these and other breeds.

1. A breed may be said to be improved, when some desirable property, which it did not possess before, has been imparted to it, and also, when its defects have been removed or diminished, and its valuable properties enhanced. Improvement, in its more extensive application to the live-stock of a country, may also be said to be effected, when, by a total or partial change of live-stock, the value of the natural produce of the soil is augmented, and a greater quantity of human food and other desirable commodities obtained from it. Whatever may be the merit of that skilful management which is necessary to the formation of a valuable breed, a considerable degree of the same kind of merit may be justly claimed by those, who have introduced and established it in situations, where its advantages had never been contemplated, and in which, indeed, the obstacles to its success might have appeared almost insurmountable. This total change of live-stock has been attempted, and with much success, both in the Highland districts, and in the Low Country of Scotland.

The change from cattle to sheep, is the only sort of improvement which could be attempted with any prospect of success in the first division, which does not afford a supply

of winter food for cattle. It has been proceeding gradually for many years, and the black-faced or heath breed was long considered the only one that could be introduced into the Highlands with advantage. A small, native race was thinly spread over this district long before, and in skilful hands might perhaps have formed the basis of a valuable breed. The land, however, was chiefly occupied by cattle, and as it was generally overstocked, in a winter somewhat longer and more severe than usual, a considerable number perished for want of food, and the diseases which it occasioned. While the black-faced mountain sheep were thus obtaining possession of the Highlands, their own native territory was gradually encroached upon by the Cheviot breed, which had been considerably improved both in carcase and wool. The attention of landholders was about the same time directed to the improvement of wool, and a society was established expressly for this purpose. As the mountain breed of sheep had been found much more profitable than cattle in the Highlands, and as the Cheviot had succeeded on their former pastures, it was expected that this variety also might thrive in the Highlands. The superior value of their wool entitled them to a preference over the mountain sheep, in case they should be found equally hardy. Several extensive farms accordingly have been stocked with this breed. Of late, the Merino, and other fine woolled breeds have been introduced into several parts of Scotland, and have reached even the remote county of Orkney.

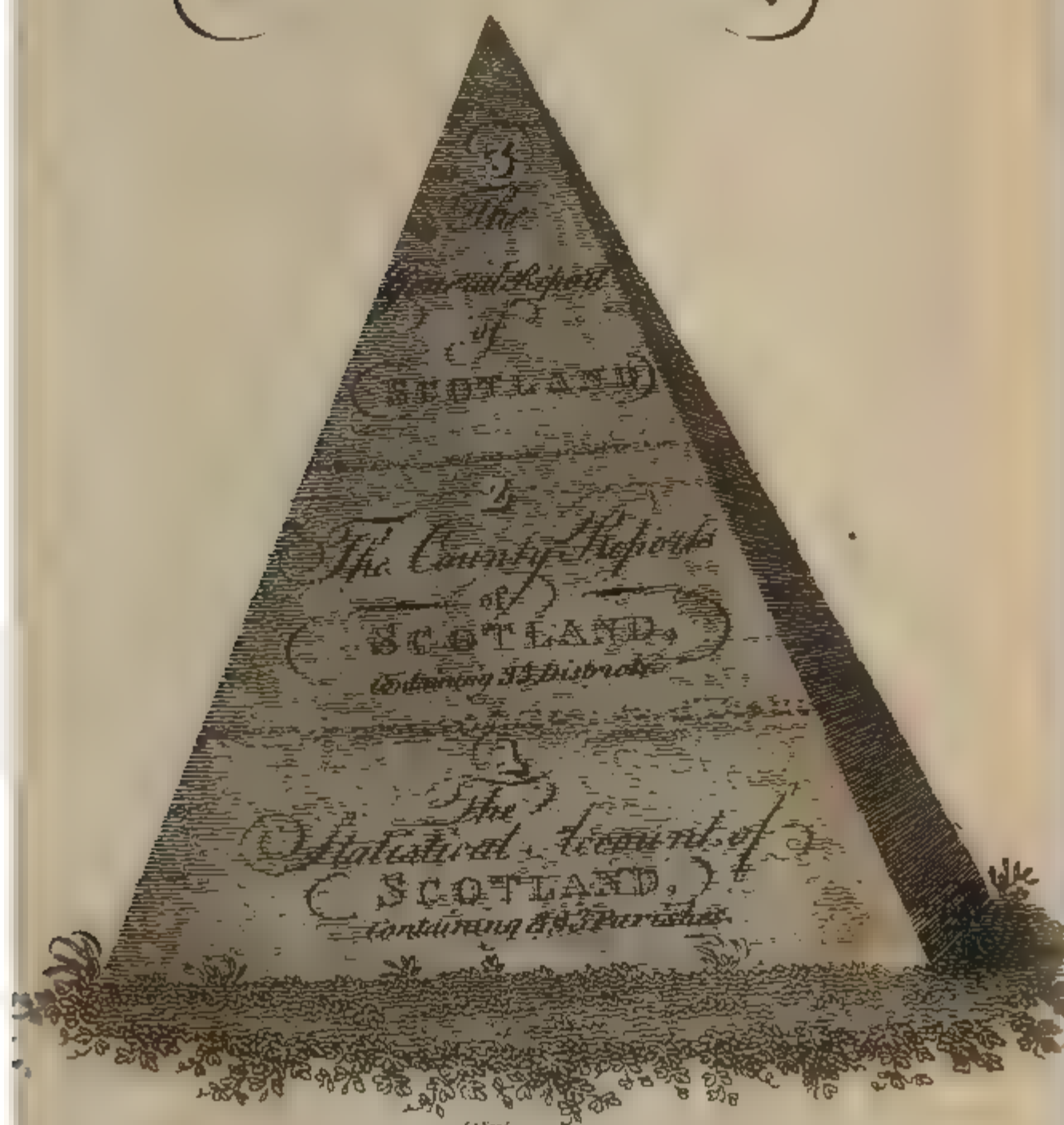
Of the success of these experiments, some account will be afterwards given. Whether the mountain or the fine woolled breeds may be ultimately found best suited to the Highlands and other parts of Scotland, included in the first general division of the surface, it was certainly judicious to attempt the improvement of the wool, rather than an enlargement of the carcase. There seems reason to believe, that a cold climate is not unfavourable to the production of fine wool; and though these experiments should not be fully suc-

cessful, the object ought not to be relinquished. The Zetland and dun-faced breeds have long been remarkable for the fineness of their fleeces, particularly the former, which carries wool, very little, if at all, inferior in quality to that of the merinos; and they have subsisted and propagated under the grossest mismanagement.

2. In the second division of Scotland, or that part of the surface which, though generally unfit for convertible husbandry, contains a portion of land capable of producing winter food, the means of improving live-stock are more accessible, and have not been neglected. This improvement, however, is limited, by circumstances which do not apply to other districts,—by the comparatively small extent of arable land, and the want of demand for fat stock, owing to the thinness of the population. The cattle and sheep of this division cannot be carried forward to the butcher, but must be driven to distant markets, at the proper age for fattening. Hence the breeder cannot avail himself of that range of experience, which commences with copulation and terminates in the shambles; and it would be hazardous to introduce any change which his judgment might suggest, after his stock had obtained a high character in the only market to which he has access.

Yet the West Highland and Galloway cattle have been greatly improved of late years, by judicious selection and better feeding, both in their size and form; and it is universally acknowledged, that for the properties of fattening speedily, when brought to good pastures, of laying their flesh on the most valuable parts, and of producing meat of the most excellent quality, they are not inferior to any cattle in the island. The stocks of the other parts of this division have been improved by the same means, and by crossing with bulls from the Isle of Skye and Argyleshire, and it is probable that all the land in the Highlands, suited to cattle-farms, will, at no distant period, be occupied by one or other of these valuable breeds.

THE PYRAMID
OF
STATISTICAL INQUIRY.



The Statistical account of Scotland, commenced in May 1790, and was completed in 1798,
 The Publication of the corrected County Reports, commenced in June 1795 and was completed in 1800
 The General Report of Scotland, commenced in 1811, and was completed in 1814.
 To complete these several undertakings, required in all a period of about Twenty four Years, and the assistance
 of above one Thousand Individuals,

LAUS DEO FINITUM.

With regard to the sheep of this part of Scotland, the Cheviot race is the most prevalent. Wherever a small supply of hay or turnips can be obtained, this breed is considered more valuable than the black-faced, and has spread over all the lower green hills, even where no provision is made for winter. The carcase of the best stocks of this variety would rather be injured than improved by a cross with the finer woolled breeds; and the price of wool of a medium quality has been lately so low, as to discourage any such experiments. There is reason to expect, that the merinos might succeed on such land, even though they should not be found hardy enough for the bleak mountains of the Highlands.

In both these divisions of the country, *breeding in and in* has not been thought advisable, and probably has never been fairly tried. A bull is seldom allowed to remain more than three years with the same stock, or a ram more than two. The general opinion is, that breeding by near affinities produces obesity, but impairs hardness of constitution, and would render the stock incapable of travelling to distant markets.

3. The means of improving the live-stock of arable land are much more extensive. Among the circumstances which have limited this improvement in Scotland, the following may be mentioned:

1. The convertible system of husbandry, generally adopted in Scotland, has been hitherto found more profitable upon the best arable land, than breeding any kind of live-stock.

2. Upon land of an inferior quality, the breeding of sheep only is considered as most generally advantageous. For such land, the Dishley or the Leicester variety, which had attained great perfection in England, was speedily adopted in all the best cultivated districts.

3. The cattle and sheep, reared upon the uncultivated parts of the country, afford a ready supply to the farmers of

arable land, and it is therefore less necessary for them to rear their own stock; and,

Lastly, The limited demand for butcher meat, particularly for such as is fattened to an extraordinary degree, and the preference universally given in Scotland to the flesh of the Highland breeds, both of cattle and sheep, are circumstances which may serve to account for the less attention that has been hitherto paid to live-stock, in the arable districts of Scotland, than in those of England.

The breeding of live-stock, however, has of late been more attended to, even on the best arable lands. An excellent variety of cattle for the dairy has been formed in the western counties, and spread over a great part of Scotland. The short-horned breed has been established in the counties of Berwick and Roxburgh: and over all the north-eastern counties, the breeding of cattle is an important object, even to the farmer of arable land. It may not therefore be improper to notice the methods pursued for improving the stock of such land.

The males and females possessed of the properties the breeder wishes to acquire, may be, 1, Of the same family; 2, Of the same race, but of different families; or, 3, Of different races.

1. The first method is called *breeding in and in*. This requires that animals of the nearest relationship should be put together, and was long supposed to produce a tender, diminutive and unhealthy progeny. It is probable that many objected to it from its appearing unnatural and incestuous. This prejudice opposed a very great obstruction to improvement; for if a male and female, out of the same dam, or got by the same sire, were never to be put together, however excellent they might be, a stock that should by any means have become better than others could not be long preserved from deterioration by strangers, nor could it be still farther improved by selection. Mr Robert Bakewell of Dishley, in Leicestershire, had the merit of removing this prejudice

in some degree; and by breeding in the same family for a great many years, succeeded in raising his sheep to a degree of perfection, which no other fattening animal ever attained in any age or country.

"It is certainly," says Mr Culley, one of the most eminent of his disciples, "from the *best males and females* that the *best breeds* can be obtained or preserved."—"When you can no longer find *better males* than your own, then by all means breed from them, whether horses, neat cattle, sheep, &c. for the same rule holds good through every species of domestic animals; but upon no account attempt to breed or cross from worse than your own; for that would be acting in contradiction to common sense, experience, and that well established rule, "*That best only can beget best,*" or, which is a particular case of a more general rule, viz, "*That like begets like* *."

This reasoning, however, is opposed by others, by denying the premises, rather than disputing the conclusion. It has been contended, that there never "did exist an animal without some defect in constitution, in form, or in some other essential quality;" that "this defect, however small it may be at first, will increase in every succeeding generation, and at last predominate to such a degree, as to render the breed of little value."—"Mr Bakewell very properly considered a propensity to get fat as the first quality in an animal destined to be the food of man. His successors have carried his principle too far; their stock are become small in size, and tender, produce little wool, and are bad breeders †."

It is admitted, however, that *breeding in and in* will have the same effect in strengthening the good as the bad properties, and may be beneficial if not carried too far, particularly in fixing any variety that may be thought valuable. And, again, the same writer observes, "There may be fami-

* Culley on Live-stock, p. 11.

† Selwight on Improving the Breeds of Domestic Animals, p. 11, 14.

lies so nearly perfect, as to go through several generations without sustaining much injury from having been bred *in and in*; but a good judge would, upon examination, point out by what they must ultimately fail, as a mechanic could discover the weakest part of a machine before it gave way *."

Those who think differently may begin by denying this conclusion, while they admit the premises. The Leicester sheep, though perhaps not absolutely perfect, are neither small, nor tender, nor bad breeders, nor do they produce but little wool. Though a few stocks to which that name has been applied, may deserve these appellations, nobody will contend that these were the characters of Mr Bakewell's own stock, or those of his most skilful followers. Sheep that weigh from 18 to 30 lbs. a quarter, clip 8 lbs. of wool upon an average, and rear four lambs for every three ewes, are certainly not the stock which Sir John Sebright means; and yet such are the Leicesters, wherever they are managed with any degree of skill and attention. This weight of carcase too, they reach, when only two years old, or even sooner.

It might also be contended, that as excellencies as well as defects must be communicated, both of them, without any particular selection, would be found in the same degree, and bearing the same proportion to each other, in the descendants as in the ancestors. If any one principle of selection be invariably adopted, it is no doubt true, that size might at last be sacrificed to a propensity to fatten, but then a remedy might easily be applied, before any serious injury had been sustained, by merely reversing the principle of selection. So that this objection rather applies to the skill of the breeder, than to the measure itself.

" But one of the most conclusive arguments, that crossing with a different stock is not necessary to secure size, hardiness, &c. is the breed of wild cattle in Chillingham Park, in

* Sebright on improving the Breeds of Domestic Animals, p. 12.

in the county of Northumberland. It is well known these cattle have been confined in this park for several hundred years without any intermixture, and are perhaps the *purest breed* of cattle of any in the kingdom. From their situation and uncontrolled state, they must indisputably have bred from the nearest affinities in every possible degree; yet we find these cattle exceedingly hardy, healthy and well formed, and their size, as well as colour, and many other particulars and peculiarities, the same as they were 500 years since *."

2d, Notwithstanding all this, it must be admitted, that there is a great diversity of opinion among intelligent men respecting the expediency of this mode of breeding, and in Scotland, a pretty general prejudice against it. The most common practice therefore is, to breed from different families of the same race. When these have been for some time established in different situations, and have had some slight shades of difference impressed upon them by the influence of different soils and treatment, it is found advantageous to interchange the males, for the purpose of strengthening the excellencies, or remedying the defects of each family. Of this advantage Mr Bakewell could not avail himself; but it has been very generally attended to by his successors. Mr Culley for many years continued to hire his rams from Mr Bakewell, at the very time that other breeders were paying a liberal price for the use of his own; and the very same practice is followed by the most skilful breeders at present.

3d, The only other method of improvement, is by crossing two distinct breeds or races, one of which possesses the properties which it is wished to acquire, or is free from the defects which it is desirable to remove. This measure can only be recommended, when neither of the former methods will answer the purpose. The very distinction of breeds implies a considerable difference between them in several respects; and although the desirable property be obtained, it

* Culley on Live-Stock, p. 10.

may be accompanied by such others as are by no means advantageous to a race destined to occupy a situation which had excluded that property from one of its parents. To cross any mountain breed with Leicester rams, for example, with a view to obtain a propensity to fatten at an early age, would be attended with an enlargement of size which the mountain pasture could not support, and the progeny would be a mongrel race, not suited to the pastures of either of the parent breeds. If the object is to obtain an enlargement of size, as well as a propensity to fatten, as is the case when Cheviot ewes are crossed with Leicester rams, the progeny will not prosper on the hilly pastures of their dams, and will be equally unprofitable on the better pastures of their sires. But the offspring of this cross succeeds well on those intermediate situations on the skirts of the Cheviot hills, where, though the summer pasture is not rich, there is a portion of low land for producing clover and turnips.

In every case where the enlargement of the carcase is the object, the cross breed must be better fed than its smaller parent. The size of the parents should also be but little disproportioned at first; and when some increase has been produced, one or more crosses afterwards may raise the breed to the required size. With these precautions, there is little reason to fear disappointment, provided both parents are well formed.

An opinion has been pronounced on this point, which deserves some notice. Mr Cline, in a communication to the Board of Agriculture, asserts, "That if a well-formed large ram be put to ewes proportionally smaller, the lambs will not be so well shaped as their parents; but if a small ram be put to large ewes, the lambs will be of an improved form." And again, "Experience has proved, that crossing has only succeeded in an eminent degree, in those instances in which the females were larger than in the usual proportion of females to males."—There is an ambiguity in these comparative terms, which would have been effectually removed by a

reference to particular breeds of cattle and sheep, rather than to horses, in which any alteration of form or size is desired on a very different account. But the meaning seems to be, that the improvement of the form depends in every case upon the female parent being larger than the male; from which it would seem to follow, that no such improvement can be effected at all. For it is added, "When the female, from her size and good constitution, is more than adequate to the nourishment of the foetus of a male smaller than herself, the *growth must be proportionally greater.*" This increase of size would incapacitate the male produce in a few generations, and it would again be necessary to cross with males from a smaller, or females from a larger breed. Indeed, as it is an invariable law of nature, with regard to cattle and sheep, that the males should be larger than the females, there could scarcely be such a thing as breeding *in and in* at all; for the most valuable animals of both sexes, would almost always be in this natural proportion to each other, instead of the female being proportionally larger than the male.

With regard to crossing, too, the breeds must be chosen for their size.

"Well-formed females may be selected from a variety of a large size to be put to a well-formed ram of a variety that is rather smaller." But whether the object of the breeder be carcase, fleece, milk, or labour, there is not a choice among many varieties; and if both are already well formed, it may be safer to let them remain as they are, whether their *lungs* be large or small; for though "the power to prepare the greatest quantity of nourishment from a given quantity of food depends principally on the magnitude of the lungs," it seems to be a solcism to say, that a *well-formed* animal can be deficient in this respect, or at the same time well formed and yet narrow on the back, and flat in the ribs, which are the usual indications of small lungs. Breeders disapprove of this shape, not because they have any concern with the internal structure of the animal, but because they

know from experience that such an animal is a bad feeder; and they correct that, or any other fault, by crossing with one which possesses the opposite good qualities, without much regard to size,—except that the offspring shall not be too large for the food upon which it must be kept.

As the male parent communicates more of its properties to its offspring than the female, and particularly of its form, the practice is, whatever may be the object of the cross, to look chiefly to the male for attaining it, unless perhaps in the instance of dairy cows. When it is found desirable, for example, to enlarge the size, and particularly to increase the weight of the fore-quarters of the Cheviot sheep, after being brought to low pastures, a Leicester ram, an animal not only larger than the females, but of a much larger variety, is employed with complete success. This mixed breed has been sometimes crossed with pure Cheviot rams of the best description, and of a much smaller size; and the offspring was immediately reduced in value, in one case about 20 *per cent.*, though continued upon the same pastures.

It has long been a subject of dispute, whether large or small animals pay the most for the food they consume. At one time the object seems to have been, to bring animals to the greatest size, and more regard was paid to their ultimate value, than to the cost of their food. Of late, since breeders began to calculate with more precision, small or middle-sized animals have been generally preferred. The question does not seem capable of receiving a correct decision, without reference both to the animals themselves, and the quality of their food, particularly of their pastures. For the feeding pastures of Scotland, an ox of from 40 to 60 stones, at three or three years and a half old, is considered preferable to a larger one. A distinction ought to be made between the profits of the breeder and the grazier: the latter may be well paid by an animal which does not leave a shilling to the former. The comparison between large and small animals should commence at their birth, and be continued till they are

slaughtered. If the quantity of food consumed by each were accurately ascertained, the result would determine whether a quick feeding animal of a moderate size, or a larger one which did not attain maturity so soon, were the most profitable. The present demand for butcher-meat, the practice of breeders, and the quality of the pastures of Scotland, seem to justify a preference for the former.

It has also been made a question, whether animals eat in proportion to their weight. Though this were correctly known, it does not appear what advantages would result. Perhaps the question ought rather to be, whether all animals eat in proportion to their improvement, or return the same weight of meat for any given quantity of food. This is the same thing as if it were asked, whether all animals were equally valuable, so far at least as respects the weight of carcase, though not the quality of flesh. The answer to this question must be a decided negative; for from any given quantity of food, animals of different races, and even of the same family, certainly return different quantities both of meat and offals.

III. It may now be proper to mention some of the rules which are generally observed in the breeding and management of live-stock.

1. Young animals much below the size to which they usually attain before being put on fattening food, should not be allowed to procreate. The male however may be employed at an earlier age than the female. Any little profit obtained by too early breeding is more than compensated by the deterioration of both the parents and the offspring.

2. Their young should be brought at the season when there is usually a full supply of suitable food. On high exposed situations, where there is little or no other provision than the common pastures, this rule should be always attended to, and very great loss has been sustained by neglecting it.

3. It is the practice of skilful managers, to keep animals intended for the butcher in a state of progressive improvement. The finer breeds are highly fed from their birth, and are almost always fat. With other breeds, and on pastures of inferior quality, this is neither necessary nor practicable. But in every case, the same principle of improvement should be adhered to, and no such animals ever allowed to lose flesh, in the idea of afterwards restoring it by better feeding.

4. The size should never be above that which the pastures can support in a thriving condition. The attempt to raise them to an undue size by crossing, has been already censured.

5. The best pasture is commonly allotted to that portion of the stock which goes to market annually; the next in quality to the breeders; and the coarser pastures to the young or growing stock.

Lastly, The food, whatever it may be, should not be too suddenly changed. It is always unprofitable to bring lean animals immediately from coarse to rich pastures; and a change from dry to succulent food, and *vice versa*, should be effected gradually.

It has been thought best, in a work of this kind, to express weights and measures in the standards most generally known over the island. Whenever, therefore, they are not otherwise designated, the avoirdupois weight, of 16 ounces to the pound, and 14 pounds to the stone, the Winchester bushel or quarter, the gallon of wine measure or its subdivisions, and the English statute acre, are to be understood. The Scotch weights and measures, when it is necessary to mention them separately, shall be reduced to those standards.

PART I.

CATTLE *.

THE cattle of Scotland do not admit of being divided into such as are kept for the dairy,—for labour,—and for their carcase. Except in one small district, no cattle are reared chiefly for their milk; and the few that are worked, are selected from among the larger varieties reared for their carcase only.

* Cattle, the *boves tauri* of Linnæus, are still known in Scotland by the several names of *black cattle*, *neat cattle*, and *nolt*; but the term “cattle” simply seems to be sufficiently appropriate and distinctive.

The general name of the male is *bull*. While he gets milk he is called a *bull-calf*,—during the first winter a *stirk* or *yearling-bull*,—then a two, three, or four year old bull. When castrated he is called a *stot-calf*, then a *stot-stirk*, and afterwards a *stot* of two or three years. At four he has the name of *ox* or *bullock*.

The general name of the female is *cow*. While she gets milk she is called a *cow-calf* or *quey-calf*,—then a *quey-stirk*,—afterwards a *year-old*, *two-year-old*, and *three-year-old quey*. When she brings her first calf she is called a *young cow*, and afterwards simply a *cow*. In some parts of Scotland, when the females are cut or spayed, they take the name of *heifers*, though that term is often used in other places for females that are not spayed.

Cattle have no fore-teeth in the upper jaw. They have eight in the under one, but no tusks or canine teeth. Their age may be known by their teeth, and by the horns of such as have any.

They cast no teeth until past two years old, when they get two new ones, and two more every following year till they are five years old; but they are not properly full-mouthed till the age of six years, as the two corner teeth are not fully grown sooner. The first circle upon the horn does not appear till they are three years old, after which they get another every year, though not always equally discernible in all horned cattle. In Galloway, where the cattle are all polled, their age from two to four years may be known, by the length and thickness of their tails, by those who are acquainted with such cattle.

It is therefore proposed to divide this Part into four Sections, for the purpose of exhibiting a view of

- I. The several breeds of cattle in Scotland.
- II. The system adopted in different districts with regard to breeding and rearing them.
- III. Their produce, under the several heads of 1st, Milk; 2d, Labour; and, 3d, Carcase. And,
- IV. Their most prevalent distempers.

The difference of breeds, as well as of their management when young, and their ultimate produce, depends in a great measure on the circumstances of the districts in which they are found; and when either these circumstances, or the several purposes for which cattle are kept, occasion a diversity in any of these respects, it is conceived that it will be a preferable method to notice this under the same general head, instead of repeating almost the same particulars under each separate division.

In describing the breeds also, a more accurate view may be obtained by attending to such as are evidently distinguished from one another by their size, form and properties, than by their locality. In some counties, all the different breeds may be found, and the very same breed extends over several others, with no other difference than such as is produced by soil, climate and management. But, as it may be desirable to know, in what counties these breeds are reared, and even the cattle that are to be found in each county,—the district over which each breed is spread will be mentioned when describing it, and a short account of the cattle and other live-stock of each county given in an Appendix.

It is necessary to observe, that the following varieties are not understood to be all of them distinct original breeds; on the contrary, they may have arisen from one, or perhaps, at the most, two varieties, and been formed partly by crossing, after different families had been long subjected to the influence of local causes, with one another, or with foreign breeds.

When the progress of such changes has been distinctly marked, the present varieties shall be traced to their origin; but in the greater number of instances, these changes have been effected at a time when experiments in husbandry attracted little notice beyond the immediate neighbourhood, and were not recorded for general information. The dairy breed of the western counties has been formed under the eye of many yet alive, and still no very satisfactory account can be given, either of the males or females, from which the present race is descended, or of the successive improvements which have advanced it to its present state. The relation between different breeds must therefore, in most cases, be mentioned as a matter of probability, resting on a similarity of shape, and sometimes on tradition. But, for practical purposes, it will be sufficient to mention as separate breeds, those races which are now sufficiently distinguished from one another, by their general appearance, and the properties which they are known from experience to possess.



SECT. I.

OF THE SEVERAL BREEDS OF CATTLE IN SCOTLAND.

THE breeds which it seems necessary to mention separately, are, i. The Highland, including the West Highland and North Highland varieties; ii. The Galloway; iii. The breeds of the north-eastern counties; iv. The Fife breed; v. The mixed breeds of the south-eastern counties; and vi. The ancient wild breed.

1. *Highland Breeds.*

The Highland breed is by far the most numerous, and extends over much the greater part of the breeding districts, as well as of the grazing lands of the arable part of Scotland. The several varieties of this breed have almost exclusive possession of all that division of Scotland, including the Hebrides, cut off by a line drawn from the Frith of Clyde on the west, to the Murray Frith on the north, and bending towards the east, till it approaches in some places very near the German Ocean. Along the eastern coast from the Murray Frith to the Frith of Forth, it is intermixed with the various local breeds, and has probably been the basis of these varieties. Under this general appellation, a great many varieties are comprehended. But all that seems necessary in this place, is to give an account of the two general varieties of Highland cattle, the West Highlanders, and the Norlands, or North Highlanders, which are not more distinguished by their situation than by their form, size, and general properties.

1st, The West Highland cattle are known by the names of the Argyleshire breed, and the breed of the Isle of Skye, one of the Western Islands attached to the county of Inverness. The latter is also distinguished by the appellation of *Kyloes* *, a name which is often applied in the south to all the varieties of the Highland breed. The West Highland cattle are at this time to be found in the greatest perfection in the Mainland and Islands of Argyleshire, and in the Isle of Skye.

The general character of the climate of this part of Scotland is an excess of moisture; but from the country being indented by numerous arms of the sea, it is mild for its latitude, and though variable, by no means inimical to animal life. The higher grounds being in many instances occupied by

* The term *Kyloes* is said to be given to the cattle of the Hebrides from their crossing the many *kyloes* or ferries of that and the other districts of the west of Scotland.

sheep, the land appropriated to cattle contains a proportion of fine green pasture and of arable land, which under correct management produces both hay and turnips.

Of the origin of the West Highland breed, no certain accounts have been preserved. It is even doubtful where "the real ancient Hebridean breed can be found. Some persons imagine it to be the Skye, and others the Mull. Others again, the Lewis or Long Island species *." The first improvement of the Argyleshire breed seems to have been produced by crossing with bulls brought from the isle of Skye; but the Argyleshire cattle are now of a much greater size than those of Skye †. The best stocks have been obtained by selection, and a more ample supply of food, and not by crossing with any other distinct breed. The Galloways approach nearest to the general character of the West Highlanders, are reared under a climate, and upon pastures somewhat similar, and are sent to the same markets, and yet it has been said that the true native breed was superior to a cross with the Galloways, and always preferred to any other by the English buyers ‡. But this must be understood of a comparison made upon the pastures of the Highland breed, and not as applicable to other situations.

The approved *form* and *colours* of this breed are thus described in the latest Report from the West Highlands :

"A bull of the Kyles breed should be of a middle size, capable of being fattened to fifty stone avoirdupois. His colour should be black, (that being reckoned the hardiest and most durable species), or dark brown or reddish brown, without any white or yellow spots. His head should be rather small, his muzzle fine, his eyes lively and prominent, his horns equable, not very thick, of a clear green and waxy tinge; his neck should rise with a gentle curve from the shoulders, and should be small and fine where it joins the head; his shoulders moderately broad at the top, joining full

* Report of the Hebrides, p. 422.

† Report of Argyleshire, p. 250.

‡ Ibid.

to his chine and chest backwards, and to the vane of his neck forwards. His bosom should be open, his breast broad, and projecting well before his legs; his arms or fore thighs muscular, and tapering to his knee; his legs straight, well covered with hair, and strong boned. His chine or chest should be so full as to leave no hollow behind his shoulders; the plates strong to keep his belly from sinking below the level of his breast. His back or loin should be broad, straight and flat; his ribs rising above one another, in such a manner that the last rib should be rather the highest, leaving only a small space to the hips or horns; the whole forming a roundish barrel-like carcase. His hips should be wide placed, rounded or globular, and a very little higher than the back. His quarters (from the hip to the rump), should be long and tapering gradually from the hips backwards, and *the turls* or pot bones not in the least protuberant; his rumps close to the tail; his tail itself should be thick, bushy, well haired, long, and set on so high as to be in the same horizontal line with his back. His general appearance should combine agility, vivacity, and strength: and his hair should be glossy, thick and vigorous, indicating a sound constitution and perfect health.

“ For a bull of this description, Mr Macneil of Colonsay lately refused 200 guineas; and for one of an inferior sort he actually received L. 170 Sterling. Mr Macdonald of Staffa bought one, nine years old, at 100 guineas *.”

The *weight* of these cattle is exceedingly various, even in the same district, according as they are fed. It is not the practice in Scotland to weigh cattle alive. The lean weight of the best stocks, in good condition, at from three to four years old, when they are commonly sold off, may be from 26 to 30 stones avoirdupois the four quarters, but the smallest are not much more than half these weights. When brought to better pastures they are often raised to 50 stones and up-

* Report of the Hebrides, p. 425.

wards *. When fat at the age of five years, the weight which is preferred by skilful graziers is, for bullocks or stots from 30 to 36, and of heifers from 24 to 30 stone †. There is perhaps no other breed whose weight depends so much on feeding, nor any that grows and fattens so much at the same time. Their prices when lean are still more various than their weights, as they depend not only upon size and shape, but on the fluctuation of the markets, occasioned by the supply of food, and the state of the demand in different seasons. Nothing therefore can be learned by stating the prices of any one year, or any one variety. Such as are of a good form always sell as high *per* stone as any cattle whatever, and when fat, it is well known that none bring a higher price from the butcher.

The general *properties* of this breed are great hardiness of constitution, which as they are driven to distant markets is an essential one,—being easily maintained, and speedily fattened on pastures where large animals could scarcely subsist,—and producing beef of a fine grain, and well marbled or intermixed with fat. Their milk is rich, but small in quantity.

2. The other variety of Highland cattle, is the *Norlands* or North Highlanders, including the stocks of the counties of Ross, Cromarty, Sutherland and Caithness.

Though there is a larger proportion of arable land in these counties than in the West Highlands, the climate is much colder. They are also at a greater distance from markets, and the breeding of cattle, till the last twenty years, does not appear to have been conducted with skill and success. The stocks of these counties and parts adjacents were known

* Report of Argyleshire, p. 251.

An ox of the Argyleshire breed, reared and fed by Mr Bogue at Linplum in East Lothian, was killed in Edinburgh market, in the spring of 1813, and weighed $87\frac{1}{2}$ stones the four quarters. He was six years old, and had been fed on grass, turnips and hay, till within eighteen months of being slaughtered, when he had oats and broken beans.

† Report of the Hebrides, p. 427.

in the markets of the low country, by their bad shapes and diminutive size. Their heads were coarse, backs high and narrow, ribs flat, bones large, and their legs long and feeble for the weight of the chest, and they were considered very slow feeders. They have since been crossed by several breeds, sometimes not very judiciously, with a view to raise them to a greater size, or to make them better milkers, or to give them more strength for labour; but the only real improvement has resulted from crossing with the Skye or Argyll breeds. These are now found in great perfection in many parts of this district, though there is still too large a proportion of the old races.

The cattle of the northern isles of Orkney and Zetland are of a very diminutive size; an ox weighing about 60 lbs. a quarter, and a cow not above 45 lbs. They are of all colours, and their shapes are very objectionable; "as their heads are low, their backs high, their buttocks thin, their bones prominent, and instead of having large wide spreading horns, they have only small ones that are short and contracted, with their tops bending towards the forehead *." Notwithstanding this, they give a quantity of excellent milk, fatten rapidly when put on good pasture, and are considered in that district, strong, hardy, and excellent workers, provided they be early well trained to the yoke, and so plentifully fed as to enable them to support their labour.

2. *The Galloway Breed.*

This variety takes its name from the province of Galloway, which includes the counties of Kirkcudbright and Wigtown, where it is reared in the greatest perfection. It has also spread over the greater part of the adjoining county of Dumfries, and is to be found in most of the other counties of Scotland. The cattle of Angus or Forfarshire seem nearly allied to the Galloways. "It is alleged not to be more than se-

* Orkney Report, p. 157.

venty or eighty years since the Galloways were all horned, and very much the same, in external appearance and character, with the breed of black cattle which prevailed over the west of Scotland at that period, and which still abound in perfection, the largest sized ones in Argyleshire, and the smaller in the Isle of Skye. The Galloway cattle, at the time alluded to, were coupled with some hornless bulls, of a sort which do not seem now to be accurately known, but which were then brought from Cumberland; the effects of which crossing were thought to be the general loss of horns in the former, and the enlargement of their size. The continuance of a hornless sort being kept up by selecting only such for breeding, or perhaps by other means, as by the practice of eradicating with the knife the horns in their very young state *."

The climate of Galloway is moist and mild, the soil dry, the herbage fine, and there is a considerable proportion of rich old pasture on the in-field or croft lands, which have not been so generally subjected to convertible husbandry as in the other districts of Scotland. A great part of the country is either too hilly for arable rotations, or too much broken by rocks, which often rise abruptly above the surface, even on the low grounds. Much of the best land is therefore allotted to cattle; and as the population is not so large as to create a demand for butcher meat, this land is chiefly employed in rearing stock, and not in fattening. The higher lands are occupied by sheep, but very few are kept on the low grounds, of which cattle have almost the exclusive possession. These considerations may serve to account for the acknowledged excellence of this breed.

In a district such as this, where it is generally in the power of the breeder to raise a sufficient supply of winter food, there is more room for improvement, than with the Highland breed, reared in less favourable situations, yet "little comparatively

* Coventry on Live-Stock, p. 28.

has been done in Galloway for improving the breed of cattle, and the very attention bestowed upon it has in many circumstances tended not a little to deteriorate it *." Now, "that proper management is better understood, crossing with any other breed is completely abandoned; and among all the best judges it is agreed, that the true improvement of the Galloway stock, is only to be obtained by crossing with the most approved individuals judiciously selected from different parts of the country †." This opinion may be justified by considering, that when established breeds have acquired a name and character in the markets of the south, as is the case with this one, a cross which might be found of much advantage, if cattle were carried forward by the breeder to the butcher, might produce such a difference in form and hardness of constitution, as to render the change very hurtful to a merely breeding district.

In the improved parts of these counties, however, attention is beginning to be paid to the dairy, in preference to breeding for the English markets; and those who have introduced the cows of the western counties, confidently assert, that they pay better for their food than the native Galloways. Whatever may be in this, there is reason to believe, that cattle which do not pay more to the breeder than from L. 4 to L. 5 a-head yearly, for the food they eat, even when kept on good pastures, will be bred on inferior soils only at no distant period. Such, at least, has been the result of improved management in other counties, where cattle were at one time bred in considerable numbers on such land as the better part of Galloway,—but which is now more profitably employed in arable rotations. But, for droving, the properties of these cattle, and the high condition to which they are raised before they are sent to the south, render them exceedingly valuable. The far greater number are sold in Norfolk in August and September, and after a few months' feeding sent to Smithfield. At

* Galloway Report, p. 238.

† Ibid. p. 246

both places they command very high prices, in proportion to their weight.

“ The following are the characters of a true Galloway bullock. He is straight and broad on the back, and nearly level from the head to the rump, closely compacted between the shoulder and ribs, and also between the ribs and the loins; broad at the loins, not, however, with hooked bones, or projecting knobs, so that when viewed above the whole body appears beautifully rounded, like the longitudinal section of a roller. He is long in the quarters, but not broad in the twist. He is deep in the chest, short in the leg, and moderately fine in the bone, clear in the chop and in the neck. His head is of a moderate size, with large rough ears, and full, but not prominent eyes, or heavy eye-brows, so that he has a calm, though determined look. His well-proportioned form is clothed with a loose and mellow skin, adorned with long soft glossy hair *.”

The Galloway cattle “ are almost universally polled, and, perhaps, rather under the medium size, being less than the horned breed of Lancashire, or the midland counties, but they are considerably larger than the North, or even the West Highlanders.

“ Their size is not very different from the Devonshire, though rather under it. But it should be noticed that the size differs materially, not only from a difference of pasture, but may, without any variation in their other characteristic qualities, be considerably either increased or diminished, at the option of the farmer. And good farmers always choose to have their breeders rather *under*, as they absurdly term it, than *above* their pastures. The prevailing colour is black or dark brindled, though they are occasionally found of every colour. This may also, with a little attention, be regulated according to the fashion of the times, or taste of the breeder. But the dark colours are uniformly preferred,

* Galloway Report, p. 236.

from a belief that they are connected with superior hardiness of constitution *.

There is a considerable difference between the stocks bred in the low country, and on the moors, particularly in length: in the former situation, length of body is always valued; in the latter, it is thought that such cattle are not so hardy †. In less essential points, their shapes have been thought somewhat objectionable. The neck and head are not so fine as in some of the most approved breeds, though in the cows those parts are by no means coarse or disproportioned. Till a very recent period, there was a prejudice in favour of thick bones, as it was thought that small bones could never carry a weighty carcase. This originated with the drovers, or rather with the Norfolk graziers, but it is now determined by the united testimony of all good farmers, that fineness of bone is a real and most valuable property. The hide is not so thin as that of the short-horned breed, but almost universally mellow and kindly to the touch ‡.

The *weight* of the Galloway cattle is less diversified than that of the Highland breeds, because their pastures and treatment are more nearly alike. On the best farms, the average weight of bullocks at three years and a half old, when the greater part of them are driven to the south, may be stated at 41 stones, and if fed another year on the best pastures, they will weigh 57 stones. When kept longer and fattened in England, they have been brought nearly to 100 stones §.

The general *properties* of this breed are, 1. Hardiness of constitution. They have been sent directly from their own pastures, to Smithfield, a distance of 400 miles, and sold to the butcher; and in spring they sometimes appear in Norfolk in as good, or better condition, than when they left home; 2. Aptitude to fatten at an early age. It is not

* Galloway Report, p. 235.

† Ibid. p. 239.

‡ Ibid. p. 241, 243.

§ Ibid. p. 248.

uncommon to find them very good beef before they are three years old; and with full feeding, there is perhaps no breed that sooner attains maturity. 3. Their beef, like that of the Highland breed, is juicy, and well mixed with fat, and fine in the grain.

Their aptitude to fatten prevents them perhaps from reaching the weights of some other breeds. They do not give much milk, but it is very rich. For the medium pastures of Scotland, they are not considered so profitable as the West Highland breed, because they are reared upon better land, and are so much in request in Norfolk, as to sell almost as high for droving, as they would do here when fattened.

The annexed table will shew the relative proportions between two Galloway cows, and two of the long and short horned breeds, in those points which are considered of the greatest importance. The comparison is said to have been made with great accuracy, and is inserted here rather for the purpose of shewing the proportions of the Galloway breed, than with a view to the inferences that may have been drawn from it.

Two of the Galloway Breed compared with two of the best Long and Short Horned Black Cattle.

	Brindled Beauty, bred at Glencaird in Minningaff,—Height 44 inches.		Yellow Dishely, bred by Mr Bake- well,—Height 53 inches.		Difference.		In ches
	Proportion, as 45 to 54, or as 5 to 6.				In favor of Gal- loway.	In favor of Long Horns.	
	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	
Width of Hooks.....	20 $\frac{1}{2}$	$\times 6 = 123$	21 $\frac{1}{2}$	$\times 5 = 107\frac{1}{2}$	15 $\frac{1}{2}$		1
— Loin.....	15	$\times 6 = 90$	16	$\times 5 = 80$	10		1
Length of Quarter.....	18	$\times 6 = 108$	19	$\times 5 = 95$	13		1
— Back.....	54	$\times 6 = 324$	70	$\times 5 = 350$		26	1
— Space.....	8	$\times 6 = 48$	10 $\frac{1}{2}$	$\times 5 = 52\frac{1}{2}$	4 $\frac{1}{2}$		1
Girth at the Rib.....	83 $\frac{1}{2}$	$\times 6 = 499\frac{1}{2}$	90 $\frac{1}{2}$	$\times 5 = 452\frac{1}{2}$	47		1
— Chine.....	69	$\times 6 = 414$	75	$\times 5 = 375$	39		1
— Neck.....	29	$\times 6 = 174$	35	$\times 5 = 175$	1		1
— Shank.....	6	$\times 6 = 36$	7 $\frac{1}{2}$	$\times 5 = 37\frac{1}{2}$	1 $\frac{1}{2}$		1
		Brindled Beauty, as above.—Height 44 inches.					
		Phoenix, bred by Mr Charles Collings.— Height 56 inches.					
		Proportion, 5 $\frac{1}{2}$: 8 = 44 : 55.				In favor of Short Horns	
Width of Hooks.....	20 $\frac{1}{2}$	$\times 7 = 143\frac{1}{2}$	26 $\frac{1}{2}$	$\times 5\frac{1}{2} = 147\frac{1}{2}$		3 $\frac{1}{2}$	1
— Loin.....	15	$\times 7 = 105$	19 $\frac{1}{4}$	$\times 5\frac{1}{2} = 105\frac{1}{2}$		$\frac{1}{2}$	1
Length of Quarter.....	18	$\times 7 = 126$	21	$\times 5\frac{1}{2} = 115\frac{1}{2}$	10 $\frac{1}{2}$		1
— Back.....	54	$\times 7 = 378$	61 $\frac{1}{2}$	$\times 5\frac{1}{2} = 338\frac{1}{2}$	39 $\frac{1}{2}$		1
— Space.....	8	$\times 7 = 56$	15 $\frac{1}{4}$	$\times 5\frac{1}{2} = 83\frac{1}{2}$	34 $\frac{1}{2}$		1
Girth at the Chine.....	69	$\times 7 = 483$	85	$\times 5\frac{1}{2} = 467\frac{1}{2}$	15 $\frac{1}{2}$		1
— Neck.....	29	$\times 7 = 203$	38 $\frac{1}{2}$	$\times 5\frac{1}{2} = 211\frac{1}{2}$	8 $\frac{1}{2}$		1
— Shank.....	6	$\times 7 = 42$	7 $\frac{1}{2}$	$\times 5\frac{1}{2} = 41\frac{1}{2}$		$\frac{1}{2}$	1
		Bell Brany, bred at St Mary's Isle — Height 49 inches.					
		Phoenix, as above — Height 56 inches.					
		Proportion, 49 : 56 = 7 : 8.					
Width of Hooks.....	21 $\frac{1}{2}$	$\times 8 = 172$	26 $\frac{3}{4}$	$\times 7 = 183\frac{3}{4}$		11 $\frac{1}{4}$	1
— Loin.....	16 $\frac{1}{2}$	$\times 8 = 132$	19 $\frac{1}{4}$	$\times 7 = 134\frac{1}{4}$		2 $\frac{1}{4}$	1
Girth at the Chine.....	73 $\frac{1}{2}$	$\times 8 = 588$	85	$\times 7 = 595$		7	1
— Neck.....	34	$\times 8 = 272$	38 $\frac{1}{2}$	$\times 7 = 269\frac{1}{2}$		2 $\frac{1}{2}$	1
— Shank.....	6 $\frac{1}{2}$	$\times 8 = 50$	7 $\frac{1}{2}$	$\times 7 = 52\frac{1}{2}$	2 $\frac{1}{2}$		1
Length of the Back....	56 $\frac{1}{2}$	$\times 8 = 452$	61 $\frac{1}{2}$	$\times 7 = 430\frac{1}{2}$	21 $\frac{1}{2}$		1
— Quarter.....	19	$\times 8 = 152$	21	$\times 7 = 147$	5		1
— Space....	10 $\frac{1}{2}$	$\times 8 = 84$	15 $\frac{1}{4}$	$\times 7 = 106\frac{1}{4}$	22 $\frac{1}{4}$		1

The West Highland and Galloway cattle may be said to occupy nearly all the north-west and south-west of Scotland; the only other variety found in any considerable number in those parts being the dairy breed of the counties of Ayr, Lanark, and Renfrew.

3. *The Breeds of the North-eastern District.*

The Lowlands lying along the eastern coast are much better adapted to tillage than the districts in which the Highland and Galloway cattle are reared. A better supply of winter food not only raises cattle to a larger size, but permits the farmer to choose his stock from different breeds, or to form a new variety by crossing. The cattle of the arable part of Scotland are accordingly much diversified in their size, colour, and general appearance, and cannot be always so well distinguished from one another as the two breeds already mentioned. The best stocks of the North-eastern counties approach to the form of the West Highlanders, but are much heavier, and may be fed at the age of eight years, to which they are sometimes kept for the draught, to almost as great a weight as any cattle in the island. The cattle bred in the south-eastern counties, whatever might have been the native races, are now fast approaching to the short-horned breed of the north of England. All the cattle from the Murray Frith to the Frith of Forth have a general resemblance; but it may be necessary to class them under two varieties, 1. That of the north-eastern counties of Nairn, Moray, Banff, Aberdeen, and Kincardine; and 2. That of the counties of Angus and Fife.

The basis of the former variety is the native breed which is still to be found, without any intermixture, in the higher grounds, that connect all of these counties, except Kincardine, with the Highlands of Scotland; and their greater size, and some slight difference in form, colour, and horns, has been produced by crosses with cattle from Fife and other districts. In these crosses, taken at a time when cattle were chiefly va-

lued for their size, any real improvement was not to be expected. As they were formerly very generally employed in labour, it seems to have been the first object, to obtain a breed stronger than the native for that purpose. Horses, however, have now nearly superseded oxen in these counties, as well as in other parts of Scotland, and a large coarse animal is no longer esteemed. The best breeders have recourse to no other means of improvement than selection among the native races, which they are now convinced can be brought to any profitable weight by better feeding, and which they find to sell better in the English markets than any cross-breed. It is observed, that every succeeding generation of the cattle of Aberdeenshire has increased in size for the last thirty years, "and that by good keeping, the native breed is double its former size, (that is, weighs at least double its former weight), since the introduction of the turnip husbandry *."

These cattle differ from the West Highlanders in their hair, which is much shorter and thinner set,—in their horns, which do not taper so finely, nor stand so much upwards, and they are also of a whiter colour. They are thinner in their buttock in proportion to their weight; and deeper in the belly, in proportion to their circumference. The colour is commonly black, but there are more of a red and brindled colour, than among the West Highlanders.

The weight of the largest breed of Aberdeenshire, (which seems to have originated from a cross with Fife bulls), when five years old, is said to be from 40 to 56 stones; at seven years, from 56 to 64; and when full fed, from 80 to 96†; but the ordinary weight of middle-sized stots, from four to five years old, when fed with rich grass for one summer, and with turnips the following winter, is from 40 to 48 stone. The weight of the cattle of Banff and Kincardine runs between

* Aberdeenshire Report, p. 468. † Ibid. p. 461-471.

these two; those of Kincardine, owing to better feeding, being more equal in size, and generally above the average.

With regard to their general *properties*,—they are not understood to attain maturity so early as the West Highlanders; but at a proper age they fatten speedily on pastures of a medium quality. Their flesh also is thought to be somewhat inferior, but they give a much larger quantity of milk.

A much greater proportion of this than of the West Highland and Galloway breeds is fattened where reared, for the consumption of Aberdeen and other towns in that district. In the county of Kincardine, fattening is more the object than breeding and rearing. A great many are brought to the south of Scotland, and kept in the straw-yards, for which they are better adapted than the smaller varieties, as they are not so impatient of confinement.

4. *The Fife Breed.*

The much larger proportion of this county is in cultivation, for which both the soil and the climate are very favourable. The improvement of its live-stock may therefore be carried to any profitable extent. It has been long distinguished by the excellence of its cattle; though, in the progress of improvements in arable husbandry, grain has now become in this, as in the other Lowland counties of Scotland, a more important object than cattle. Of all the *native* breeds, this is perhaps the best adapted for arable land, as like the short-horned breed of England, they are valuable for the three desirable properties of beef, milk, and labour. Yet the great object of the breeder is the carcase, the dairy is but a secondary one, and there are very few worked in their native district.

This breed and its crosses are found in almost every county of Scotland. In its purest state, it occupies almost all the pastures of Fife, and shares with several other breeds the contiguous county of Angus.

There are various traditions about the origin of this breed. It is said to have been much improved by English cows, sent by Henry VII. to his daughter, the consort of James IV, who usually resided at the Palace of Falkland in this county. Because there is some resemblance between the cattle of Fife and Cambridgeshire, they are supposed to have been brought originally from that county: While others ascribe the origin of the present breed to bulls and cows sent by James VI. (James I. of England), in payment of the money which his obliging neighbours in Fife are said to have advanced for his equipment, when he went to take possession of the English throne*.

Whatever may have been the means of improving this breed in former times, it is asserted that no crossing can now be otherwise than injurious; that all "foreign and mixed kinds should be extirpated as fast as possible, and that the farmers of Fifeshire ought to confine themselves entirely to the native stock†." When the handsomest males and females are selected for breeders, and proper attention paid to feeding and management, these cattle, like the Galloways and West Highlanders, are so much in request in the English markets, that it would probably be injudicious to introduce any considerable change; and even when they are fattened at home, they are found by no means defective in all the most essential properties.

The following are considered as the chief characteristic marks of the Fife breed: "The prevailing colour is black; nor are they less esteemed, though spotted or streaked with white, or of a grey colour. The horns are small, white, generally pretty erect, or at least turned up at the points, bending rather forward, and not wide spread like the Lancashire long-horned breed. The bone is small in proportion to the

* Report of Nairn and Moray, p. 305.

† Life Report, p. 258.

carcase; the limbs clean, but short; and the skin soft. They are wide between the extreme points of the hook-bones; the ribs are narrow and wide set, and have a greater curvature than in other kinds, which gives the body a thick round form. They fatten quickly, and fill up well at all the choice points. They are hardy, fleet, and travel well; tame and docile, and excellent for work, whether in the plough or in the cart *. —And as the Fife cattle are in high estimation for the shambles, so they are of equal repute for the dairy. A good Fife cow will give from 10 to 14 pints of milk *per* day, (2 Scotch pints are nearly equal to an English gallon), from 7 to 9 lb. of butter, and from 10 to 12 lb. of cheese *per* week, *tron* weight, for some months, after calving †."

A bull of this breed was measured by two members of the Fife Farming Society, and the following statement will enable the reader to compare its proportions with those of other breeds.

	Feet.	Inches.
Length of the head, - - - - -	2	0
Ditto from the root of the horn to the rump,	8	4
Ditto from the root of the horn to the top of the shoulders, - - - - -	2	6 $\frac{1}{4}$
Ditto of the horn, - - - - -	1	0 $\frac{1}{4}$
Distance from point to point of ditto, -	1	10
Girth of the body at the shoulder, - -	7	6 $\frac{1}{4}$
Ditto before the hough bones, - -	7	8 $\frac{1}{4}$
Ditto fore-leg, smallest part, between the knee and hoof, - - - - -	0	9 $\frac{3}{4}$
Ditto hinder-leg, at ditto, - -	0	9 $\frac{1}{4}$
Ditto fore-leg, at fore-spald, - -	2	0
Height at the shoulder, - - - - -	4	11
Ditto at the hough bone, - -	4	11

* Fife Report, p. 251.

† Ibid. p. 253.

	Feet.	Inches.
Height from the shoulker to the breast-bone,	3	6
Ditto of the knee-joint fore-leg, - -	1	0 $\frac{1}{2}$
Breadth of the hough bones, - -	2	2
Ditto of the arc-bones, - - -	1	4 $\frac{1}{2}$

The weight of bullocks at three years old, when they are sold for the English market, is supposed to be about 32 stones. When fed for the butcher, they reach from 50 to 60 stones, though they greatly exceed this weight when kept till six or eight years old.

5. *Varieties of the short-horned Breed.*

The only other breeds in Scotland that require to be noticed here, are varieties of the short-horned or Dutch breed, which are found throughout all the arable districts. They seem to have been produced by crossing with the native breeds, for the most part, with no other view till lately than to increase the size. The shapes and colours are therefore much diversified, and, with the exception of the border counties of Berwick and Roxburgh, and the western counties of Ayr, Renfrew and Lanark, there seems to have been little attention paid to that correct management, which has brought this breed to such great perfection in the north of England. In the former counties they are bred chiefly for their carcase, and very nearly resemble the best of their race; in the latter, the chief object is their milk, and they are much smaller, and differ considerably in their shapes from the best short horns. Yet as bulls of the pure breed have been lately introduced into the western as well as the eastern parts of Scotland, there is reason to believe, that the form for fattening will soon be improved, without affecting their properties for the dairy.

Of the cattle of Berwickshire, and the other Lowland districts of Scotland, where beef is the primary object, it does not seem necessary to give any particular description. This may be found in the Reports of the English counties, where the

short-horned breed has originated, or is found in the greatest perfection; and an account of the cattle of the several districts of Scotland will be given in the Appendix. But as the dairy cattle of the western counties, are now a somewhat distinct breed, it will be proper to describe them more particularly.

No accurate account has been preserved of the origin of this breed, though about forty years ago, the cattle in the best parts of Cunningham, (the northern division of the county of Ayr, which has since been famous for producing the best of this breed,) were of a small size, with high standing crooked horns, narrow on the back, and flat on the ribs, and mostly of a black colour, with white spots on their faces and other parts. About that time, or a little before, both bulls and cows of the Tees-water, or short-horned breed, are said to have been introduced into Ayrshire, by several proprietors, and it is from them, and their crosses with the native stock, that the present dairy breed has been formed.

“ The *shapes* now most approved of in this variety among dairy farmers are as follow : *Head* small, but rather long at the muzzle. The *eyes* small, but smart and lively. The *horns* small, clear, crooked, and their roots at a considerable distance from each other. *Neck* long and slender, tapering towards the head, with no loose skin below. *Shoulders* thin. *Fore-quarters* light. *Hind-quarters* large. *Back* straight, broad behind, joints rather loose and open. *Carcase* deep, and *pelvis* capacious, and wide over the hips, with round fleshy buttocks. *Tail* long and small. *Legs* small and short, with firm *joints*. *Udder* capacious, broad and square, stretching forward, and neither fleshy, low hung, nor loose; the *milk* veins large and prominent. *Teats* short, all pointing outwards, and at considerable distance from each other. *Skin* thin and loose. *Hair* soft and woolly. The *head, bones, horns*, and all parts of *least value* small, and the general figure compact and well proportioned *.”

* Ayrshire Report, p. 426.

Their colours are much varied, but commonly red or brown with a mixture of white, or what is called *flecked*, and by this they are easily distinguished from all the native breeds of Scotland. The dairy breed on the Clyde, at and above Hamilton, is somewhat different in figure from that of Ayrshire. The cows are larger and rounder in the chest, and much heavier in the fore-quarters. A bull of that description has lately been extensively used there, which shows that the breeders are now desirous of accommodating the grazier as well as the dairy-maid.

Their general properties are tameness and docility, but they are not hardy, and cannot travel much without injury. They fatten well when not in milk, and their beef is of a good quality. They may weigh from 24 to 36 stones before being fattened.

6. *The Wild Breed of Cattle.*

These are to be found in Hamilton Park, in the county of Lanark, the seat of the Duke of Hamilton; Ardrossan in Ayrshire, belonging to the Earl of Eglintoun; and Auchencruive Park, in the same county, the seat of Richard Oswald, Esq. and perhaps in one or two other places. They are found, however, in a purer state in Chillingham Park in Northumberland, the seat of the Earl of Tankerville.

These cattle are uniformly of a creamy white colour, their muzzles and the greatest part of their ears either black or brown; some of those in Hamilton Park have a few black spots on their sides. A few are without horns, but the greater number have very handsome white ones, with black tops bent like a new moon. Some of the bulls have a sort of mane, four or five inches long. They are understood to be the remains of an ancient breed that has never been tamed, and were formerly kept in their wild state by many noblemen and wealthy proprietors.

Those still kept in Scotland are undoubtedly the ancient wild breed, though as they are less secluded than formerly,

the cattle at Hamilton and Ardrossan are not now so fierce and savage as their ancestors. At Auchencruive they still retain much of their natural ferocity.

The form of the cattle at Hamilton is by no means good, and they are never very fat. Their backs are high, and not so straight as could be wished. Their chest is deep, but narrow, and they have much the appearance of the ill-fed native breed of cattle of Ayrshire, Lanarkshire, &c. about forty years ago. They have long been confined to a piece of sterile clay soil, and the herbage is neither abundant nor of good quality,—but they are allowed a regular supply of hay in winter. Some of these cattle have lived till they were upwards of twenty years' old, but they are generally shot before they attain the half of that age. It has been reported that their flesh is coarser than that of Highland cattle, and some say it tastes like venison; but others who have eaten of it could not perceive that it differed from the flesh of other cattle. The weight of the oxen at Chillingham Park is from 35 to 45 stones, and of the cows from 25 to 35 stones the four-quarters, and the beef is finely marbled, and of excellent flavour *. A farther account of the habits and properties of these cattle, will be found in the Northumberland Report, and in Mr Culley's Treatise on Live Stock.

Besides these breeds, the Alderney and other varieties have been introduced into several parts of Scotland, but in such small numbers, that it is unnecessary to describe them in a work of this kind, none of them having become objects of attention to farmers.

* Culley on Live-Stock, p. 74.

SECT. II.

OF THE BREEDING AND REARING OF CATTLE.

As the management of the Highland and Galloway breeds is different from that of the cattle of the arable districts, it will be proper to mention them separately.

I. With regard to the Highland and Galloway breeds, the selection of males and females for breeding is made without much regard to the value of the latter as milkers, and too often with a view to increase the size, rather than the more valuable properties of the offspring. As the principal food in winter is straw or coarse bog hay, it is seldom desirable to have the calves till near the beginning of the grass season; yet, as the bulls are generally depastured with the cows all the summer, the calves are dropt at all times from January to May. Where the winter food is of a better quality, it is justly considered an advantage to have early calves, as they grow so much during the first summer, and are so well prepared for the hardships of the ensuing winter, that at two years' old, they are scarcely inferior to a late calf at three. For the same reason that calves are dropt at such different periods, the cows themselves become mothers at different ages, as they are too often allowed to become pregnant whenever they will receive the bull, whatever may be their age. In general they do not bring their first calf till they are three years' old, and some of the Highland cattle not till they are a year or two older *.

* The period of gestation in cows has been stated in a memoir published at Paris, to run from about 35 to 44 weeks,—the common term is 40 weeks. They seldom bring more than one calf at a birth. When they produce twins, one of

The calves are almost universally allowed to suck their dams so long as they give any milk, and most of them will not give it unless their calves get a share of it at the same time. This practice is highly improper where the pasture is good, and the calves come early. The sooner they take to grass the better, and on such land the milk of the cows for two or three months would be of considerable value for other purposes. It is certain, however, that the calves thrive better the first summer, than if they had got a larger quantity from the pail. The milk-maid takes one side of the cow, and the calve the other, and both exert themselves to extract their share of the treasure. The cow acts as umpire between them; she will yield not one drop of milk to the former, till the latter is placed to a teat; and if the maid gives the least interruption to her rival, the cow punishes the fraud by a blow with her leg, and often overturns both the girl and the pail. This is particularly the practice in Galloway. In some parts of the Highlands, the calf is allowed the whole milk of her dam, and sometimes more. Where there is not a sufficient inclosure for confining the calves when they are put to grass, a muzzle is made for the nose with iron-pins fastened on it, which prick the cow when the calf attempts to suck at forbidden times, and obliges her to keep it off, till the time of milking, when the muzzle is removed. By this expedient, the calf is not prevented from eating grass, but it is too troublesome when there are more than two or three calves*.

In Galloway, at an average, three calves are reared from every four cows kept, or four from five. In the West Highlands and Hebrides, a smaller proportion is reared, and

them a male, and the other a female, the latter is commonly considered incapable of propagation, and is called a *Free-martin*. Yet this general law seems not without exceptions, for which see Farmer's Magazine, vol. vii, p. 462, and vol. viii, p. 466.

* Galloway Report, p. 258.

the milk converted into butter and cheese. In the North Highlands only one calf is reared from every two cows, whom it is allowed to suck for three months, and is then turned off to a separate inclosure. In Galloway all the females that are not required for keeping up the stock, are spayed when about a year old, but this is very rarely done in the Highlands.

During the first winter, the calves are allowed the best of the fodder. They are usually kept in the house, or in open sheds, during the night, and turned out to the nearest pasture, for a few hours a-day, when the weather is mild. Next summer they are kept on the coarsest and highest pastures, the finest being reserved for the cows and young calves. They are never afterwards housed in Galloway and the West Highlands, except such as are kept for breeding. A small allowance of straw or coarse hay is usually carried to their pastures through winter; but there are now a good many straw-yards, where the young cattle are kept through the night, and sometimes get a few potatoes or turnips. In the North Highlands, it is the common practice to keep the cattle in houses through the night, both in summer and winter, which is very justly condemned. For if they were kept in open sheds, instead of close byres, "they would be more hardy, keep a better pile of hair, and, of course, would be of greater value to drovers, who send them to the markets in the south of Scotland, and even to England *."

When a farm consists of pastures of different qualities, and is so large as to admit of a division of the stock, the practice of attentive managers is, to allot the best for the cows and calves, the coarsest for the young rearing stock, and to keep those of three years and upwards, that are to be disposed of annually, on pastures of an intermediate description. In Galloway, the cattle that are to be sold in August and September for the Norfolk markets, are usually kept on the best

* Report of Caithness, p. 198.

pastures, and grass-parks are often rented for them at a high rate.

The great errors which prevail in a less or greater degree over all these districts, with few exceptions, are, over-stocking in summer, and neglecting to provide food for winter. The loss occasioned by this cruel mismanagement is enormous in many situations, even in ordinary seasons, and in almost all of them, in a very severe one. In some of the Western Islands, "the small tenants crowd their lands with wretched beasts, to the number of three or four to each acre," and the consequence is, that "one-fifth perishes from want, and the remainder sells usually at little more than one-third of the price which is paid for cattle of the same breed, in the well-managed islands *." In Argyleshire, the loss is estimated at one-eighth part, on cattle below the age of two years and a half †; and even in Galloway, the loss from this and other causes, has been estimated so high as one in five, below the age of two years ‡. In all the Reports of the Highland counties, the same mismanagement is complained of, and yet there seems to be but few cattle farms, and there certainly ought to be none, where a supply of turnips and hay might not be provided. The loss to the public, to the proprietors, and to the tenants themselves, is a matter of very serious importance.

But the evil does not terminate here; there are other very injurious consequences. The first is, that any improvement of the breed is a matter of impossibility; and, in the next place, the improvement of the soil itself is almost equally so. For without straw for litter in winter, and green crops to be eaten along with hay or straw, there can be very little manure made. It will scarcely be believed, that there are yet instances of farms, producing 100 acres of corn, besides cul-

* Report of the Hebrides, p. 436.

† Argyleshire Report, p. 255.

‡ Galloway Report, p. 259.

tivated grasses made into hay, where both the straw and the hay are consumed on the farm, and yet not 100 tons of dung produced. The object is, to keep as many cattle as can possibly be supported. The straw is carried to the pastures, and eaten up to the last pile; and the small quantity of dung obtained from the working-stock and cows kept in the house, with scarcely any litter, is barely sufficient for a few acres of potatoes. It is not easy for a stranger to conceive, how completely even the best soils are exhausted by this management, accompanied, as it generally is, by a succession of corn crops, forced by the application of lime and other calcareous manures, until the land will no longer return the value of seed and labour.

II. The cattle reared upon land which produces a sufficient supply of winter food, as is generally the case on the eastern coast of Scotland, and in the western dairy counties, are treated in a different manner.

The number of calves reared, bears a smaller proportion to the number of cows kept. A great many are fattened and slaughtered when a few weeks old. In the dairy districts, all that are dropt in summer are usually sent to the butcher a few days after.

The calves which are reared, are also managed differently from those of the Highland and Galloway cattle. They are seldom or never allowed to suck, but are fed from the pail, and receive, at an average, about four Scotch pints daily, or something less than two English gallons wine-measure, for twelve or thirteen weeks;—in the western counties, sometimes only for six or eight. The calf that is fed by sucking must depend upon the milk of its dam, however scanty or irregular it may be; whereas, when fed from a dish, the quantity can be regulated according to its age, and the object in view, whether rearing or fattening. Besides, various substitutes may be resorted to, by which the milk may be saved for

other purposes, or a greater number of calves reared with the same quantity.

It is not uncommon upon some farms to rear twice as many calves as the number of cows, and there are some instances of even four calves being reared for every cow. The supernumeraries are purchased from farm-servants and others, who cannot rear them, and also from farmers, who prefer keeping Highland or other aged cattle to rearing from their own cows.

The most common substitutes for milk are hay, turnips, meal, lintseed, and oil-cake.—Eight calves were reared for two cows, for several years, by means of turnips and a little corn on the straw. The home calves had sweet milk for the first eight or ten days, and the others were not brought home till that age, as not only sweet milk, but that of their own dams, is at that time preferable to any other food. When the number was completed, the allowance of sweet milk was gradually diminished, and a portion of skimmed milk or whey, and turnips boiled to a jelly, were added to it. The quantity of the turnips was increased by degrees, and they were boiled less and less. At the end of a month they were given raw, cut into thin slices, and served up in a small manger, having a rack above for oats on the straw. From this time, they had very little of either sweet or skimmed milk, and ate the turnips and oats with a good appetite. The place in which they were confined was kept clean and dry by abundance of litter, and in mild weather they were turned out once a-day. As they were always early calves, they were ready to go to the first of the grass, and, at the end of summer, were not inferior in size and condition to late calves that had been reared wholly on milk, and they took immediately to their winter allowance of turnips and straw. There never was a death among them.

Oil-cake has been also used as a substitute with very good effect, and milk wholly withdrawn after the first three or four weeks. The cake was broken into small pieces, and thrown into a tub into which boiling water was then poured, and the

pieces first well stirred with a stick, and afterwards squeezed with the hand, till as much was dissolved as the water could hold in solution. Sometimes the oil-cake is first ground into a fine powder, but that cannot be always done, and every farm-servant may prepare it in this way. The calves got a little of this liquid along with their milk, after the first week; and in about ten days more, by increasing the quantity of it, and diminishing that of the milk, the latter may be withheld altogether. They were allowed as much of it, milk warm, as they could take, and weaned at the end of three months as usual. One hundred-weight of the oil-cake is sufficient for rearing three calves, which even at 15 s. makes the expence of giving it for more than two months instead of milk, only 5 s. a-head.

Whatever auxiliaries or substitutes are employed, the change from milk should be gradual; and in the case of liquid food, it should be heated to the temperature of milk, as it is taken from the cow.

The food and management afterwards must be regulated by circumstances, according to the object the breeder has in view, and the accommodations of his farm. The breeding and rearing of cattle, as has been already noticed, is not considered so profitable, upon good land in Scotland, as grazing or fattening. The Lothians and Berwickshire at one time were such breeding counties as Aberdeen is at present, but comparatively few cattle are now bred in these counties, unless upon farms that have a portion of coarse pasture attached to them, and that is every day diminishing. It is, however, found profitable to breed sheep even upon very good arable land; and it may soon be no less so to breed cattle also, especially if a variety be obtained, which, like the Leicester breed of sheep, can be fattened with advantage at an early age. Already the short-horned breed is reared upon some of the best land of Berwick and Roxburgh shires; the cattle are fully fed from their birth, and at three years old are as fit for the butcher as in other situations when a year

older. It is still, however, the general practice even there, as well as in other parts of the arable district, to graze and fatten cattle that have been reared on land but partially cultivated, and to such situations only, the food and management to be here mentioned are applicable.

If the circumstances of a farm will admit of it, the same classification of different ages and pastures which has been already noticed in the case of the Highland and Galloway cattle, is adopted with these breeds also. The principal difference is in the food and management during winter.

When turnips were first introduced into cultivation, they were generally reserved for fattening cattle, and cows in milk, and nothing better than straw continued to be given to the young stock. The stirks or calves of the first winter, were soon allowed a few small turnips along with the tops of those given to the fattening stock, and their improvement was perceived to be so great, that the practice is now almost universal. During the second and following winters, turnips are often withheld altogether, or at the most given sparingly, and only in spring. But before they are sold to the grazier, which is usually at three years old, unless they are worked,—as it is of importance to present them in good condition, they commonly have a liberal allowance, especially in the spring months.

There is no way of consuming a portion of the turnip crop with more advantage, both with a view to the improvement of the cattle, and increase of the dunghill. A ton of turnips is a fair daily allowance to a score of young cattle, and an acre of a good crop will serve that number for a month. In several districts, turnips are not valued at more than L. 5 an acre, so that the cost of each beast for six months will be no more than 30 s.

These cattle are generally wintered in straw yards, except such of the females as are to be kept for breeding. There are usually open sheds alongside the straw-yards, to which they have always access. Both their straw and turnips,

however, are commonly given them without the shed, the former in *hacks* or racks, and the latter strewed over the yard.

The *racks* are of a very simple construction, consisting of four upright posts standing at right angles, about three feet distant, connected by two cross rails, and sometimes having a sparred bottom. Three or four cattle have room to eat round each of them, and they serve to shelter the weak from the attacks of the strong. As the yard ought always to be well littered, there are very few turnips lost by this method, and the cattle are found to thrive better than if they were laid into a manger or trough, unless constant attention were paid to keep it very clean; for, as they are given to young cattle with tops and tails on, the refuse soon becomes putrid, and the place emits a most disagreeable smell. When they are spread over a well-littered yard, this refuse is gradually absorbed in the general mass. There is reason to believe, also, that cattle will eat in the open air what they refuse in the house.

Where only a very few cattle are reared, or when it is wished to use the straw with economy, as is too often the case in some counties, they are still tied up in the house in the night, and turned out to the pastures during a part of the day. But this is a practice that cannot be recommended, either on account of the cattle or the land. Young cattle thrive better, and are more hardy, when kept in the open air both winter and summer, with access to sheds, and sell higher to the grazier or drover, than such as have been kept in the house. When they have an allowance of turnips, they are never turned out at all through the winter, and the land is preserved from being poached in wet weather, which is of more importance than any benefit the cattle can receive from the pastures at that season. Cattle moderately supplied with turnips seldom drink; but it is certainly proper that they should always have access to water, which is therefore generally conveyed into the straw-yard, or raised by a pump. Be-

sides the Berwickshire hammels, which will be afterwards noticed, the common fold-yards are almost always divided into two parts, and often into more, by which means cattle of the same age and size can be kept together. When the object is to convert the straw into manure, pits for receiving the urine are seldom necessary, because it is absorbed by the great abundance of straw thrown among the cattle.

These circumstances, though apparently too minute for a work of this kind, have been mentioned here, because they are applicable to the practice of wintering cattle in all the arable districts, as well on breeding farms, as on those where cattle are purchased at the end of autumn and sold in spring, and kept merely to convert the straw into manure.

SECT. III.

OF THE PRODUCE OF CATTLE.

HAVING thus described the breeds of cattle in Scotland, with their food and management, until they are of an age to be applied to the purposes for which they are reared, or for which they are adapted, it is now necessary to mention their food and management, and the produce they ultimately return, in I. Milk ; II. Labour ; III. Carcase.

I. MILK.

Among the several breeds of cattle that have been mentioned, the only one that is kept for the milk of its cows, is the Ayrshire or west country breed ; but the short-horned cows of the Lothians and border counties, and the native breeds of Fife and the north-eastern district, yield considerable quantities of milk beyond what is required for rearing

their calves. Great numbers are kept in large towns for supplying the inhabitants with milk, and in the country large quantities of butter and cheese are made, and many calves fattened, in these counties, as well as in those of Ayr, Renfrew and Lanark, where the dairy is the chief object of attention.

The *food, management, and produce* of milch cows, depend on local circumstances, and must be viewed in connection with the value of their produce. The price of beef does not vary perhaps more than 20 or 30 *per cent.* in different parts of the island; but milk brings double the price in large towns, which it is worth at a few miles distance. Cows, therefore, are fed and managed very differently, as they are kept in or near large towns, where milk, fresh butter, and butter-milk can be sold at high prices, or in the country, where there is a very limited demand for these articles.

It is therefore proposed to consider the produce of cows, so far as regards milk, otherwise employed than in rearing calves, under the following heads: 1. Town Dairies, where the milk is sold as it comes from the cow; 2. Butter Dairies, where the milk is made either into butter and butter-milk, or into butter and skimmed-milk cheese; 3. Cheese Dairies; And, lastly, when it is applied to the fattening of calves.

In treating of the third division, it will be proper to attend more particularly to the Ayrshire cows and their management, as the principal cheese dairies of Scotland are in that county.

§ 1. *Town Dairies* *.

1. The greater part of the cows kept in Edinburgh are brought from the counties of Berwick and Roxburgh, and weigh when fat from 40 to 60 stones avoirdupois. They are purchased by dealers, who drive them to market when

* This branch will be sufficiently understood, by confining our remarks to the practice in the metropolis; and some account of an extensive dairy, lately established at Glasgow, shall be given in the Appendix.

they are about to calve, or immediately after calving. Many of them are too old for being kept with advantage on the usual food allowed them in the country, or to be fattened on turnips; and part of them are purchased from hinds or married ploughmen, who have no means of fattening them. A cow which shows a great deal of milk, sells in Edinburgh nearly as high as a fat cow of the same weight.

The cowfeeders of Edinburgh do not find it for their interest to keep their cows more than one year, nor even so long, if they can be fattened sooner. Their object is to have as great a quantity of milk as possible in the first instance; and when they fall off in milking, as they almost always do from between four and six months after calving, to prepare them speedily for the butcher. Most of the cows continue to give a good deal of milk while they are fattening, and even till they are sent to the shambles. It is expected that they should sell to the butcher at the price paid by the cowkeeper. In some instances, they have sold at from £. 3 to £. 5 above it; and in no case is there such a loss upon the carcase, as is said to be sustained in the London dairies. When fat, they have from 5 to 12 stones avoirdupois of tallow.

2. Their food in summer is brewers' and distillers' grains and dreg, wheat *shellings* or small bran, grass and straw; and in winter the same grains, dreg and bran, with turnips or potatoes, and hay, instead of grass. When grains are scarce, cut or chopped hay is mixed with them. Some of them are sent to pasture in fields near the city, for about two months during the best of the grass season; but even then, a certain number must be kept in the house, for consuming the grains, which are purchased by contract for a whole year*.

* "When turnips are very scarce, Mr M'Callum," (a cowfeeder in Edinburgh), "gives sea-weed in lieu of them, particularly in the months of February, March and April. This he gets on the black rocks near Leith at spring tides only, so that he keeps some of it for two weeks. There are two species used, the *fucus digitatus* and the *fucus serratus*. He does not use the *F. vesicu-*

The quantity and price of each kind of food for one cow *per* day, has been stated as follow :

SUMMER.	WINTER.
Grain, 4 pecks, or 1 firlo, at 4s. <i>per</i> boll, equal to 6s. <i>per</i> boll of malt, L. 0 1 0	Grains, L. 0 1 0
Distillers' dreg, 12 gallons, 0 0 4	Dreg, 0 0 4
Small bran, 1 peck, at 10s. a boll, 0 0 7½	Bran, 0 0 7½
Cut grass 0 0 8	Turnips, 1 cwt. 0 1 0
Straw, 0 0 3	Hay, ½ stone, (11 lb.) 0 0 6
	Straw, 0 0 2
	<hr/>
	L. 0 3 7½
	<hr/>
<hr/>	
L. 0 2 10½	
Summer, 0 2 10½	} average <i>per</i> day, L. 0 3 3
Winter, 0 3 7½	

3. With regard to *management*,—the cowkeepers begin to feed with grains, dreg, and bran, mixed together, at 5 o'clock in the morning, feed a second time at 1 o'clock afternoon, and a third at from 7 to 8 in the evening. Grass in summer, and turnips or potatoes in winter, are given at both intervals. A small quantity of straw is laid below the grass, which absorbs its moisture, and is eaten after the grass; and in winter, straw or hay is given after the turnips. Part of the turnips or potatoes are boiled, particularly when there is a scarcity of grains, and intermixed with them. The cows are seldom milked more than twice a-day: for about a month after being bought, it is

losus, lest it fill the cows too full of *wind*, meaning air. Mr M'Callum begins by parboiling the sea-weed, and giving the cows a little of the water it has been boiled in: When they drink the water, they are then offered some of the parboiled weed itself; and when they eat it parboiled, it is gradually exhibited to them raw. He gives each cow, once or twice a-day, as much as a person can neatly carry at once between his two hands. These marine plants operate as a gentle laxative, and Mr M. thinks the use of them promotes the health of his cows, and consequently adds to the quantity of the milk they yield." Sir John Sinclair's Husbandry of Scotland, 1st edit. Appendix, p. 53.

sometimes necessary to milk them three times. The common periods of milking are 6 o'clock in the morning, from 3 to 4 in the afternoon, and, when milked a third time, 9 in the evening.

4. Their *produce* in milk, when fed as already stated, may average about seven Scotch pints, or nearly twelve quarts and a half daily *per cow* *. When the cows are smaller, and not so well fed, five pints is said to be the average. The price of milk in Edinburgh, summer and winter, is 6 d. *per* pint, though sometimes 8 d. in winter, at Glasgow. This is 3 s. 6 d. a-day for each cow, which is very little more than the price of the food. For interest of money, risk, expences of management, and profit, there is the dung, worth L. 3, 10 s. for each cow ; some saving on the cows while at grass, which costs only 20 d. a-day ; and probably a small advance of price may be commonly got from the butcher, when the cows are skilfully selected and well managed.

Comparing the Edinburgh with the London dairies, there appears to be a considerable difference in favour of the former. The average produce *per cow* of the London dairies has been stated at only seven quarts a-day ; and to support this average upon twenty cows through the year, six additional ones must be bought in, upon which, and the same number sold, there is said to be a loss of L. 50. The loss upon the whole, for one year, is alleged to be no less than L. 151, 11 s. or L. 7 : 11 : 6½ *per cow* †. When the distillers are not allowed to work from grain, the cowfeeders of Edinburgh complain that their trade is a losing one ; and if the milk is sold without adulteration, it probably is so ; but no such loss as this is ever pretended, unless from diseases and accidents.

There have been instances of cowfeeders contracting with

* The Scotch pint contains 103,404 cubic inches, and the English wine gallon 231 ; the quart is therefore 57,750 cubic inches.

† Parkinson on Live-stock, vol. 1, p. 66.

the retailers of milk ; but the practice is not common, as they generally retail it themselves. In one instance, a guinea a-week for the milk of each cow was paid by retailers to a farmer in the vicinity of Edinburgh.

§ 2. *Butter Dairies.*

Of these there are two different descriptions ; 1, Such as are kept in or near large towns for the sale of butter-milk, as well as fresh butter ; and, 2, Those dairies scattered over the country, where cows are not kept chiefly for their milk, though a portion of it is converted into butter and skimmed-milk cheese.

1. *Butter and Butter-milk.*

From the suburbs of Edinburgh, Glasgow, and other large towns, to a distance of about ten miles around them, and even in these towns also, when all the milk cannot be sold sweet, it is the practice to convert it into butter and butter-milk, for both of which there is a great demand in such places. The butter-milk is sold to the poorer classes, who cannot afford to purchase sweet milk.

1. The cows kept for this kind of dairy are of the breeds that have been already mentioned. In West Lothian the Fife cows are much esteemed. In the neighbourhood of Glasgow, they are of the Ayrshire breed; and round Edinburgh, the mixed stock of the Lothians and border counties.

2. The principal articles of their food are grass in summer, and turnips and potatoes with straw in winter. The potatoes are often boiled or prepared by steam, and mixed with chaff or cut straw. Other articles are occasionally given, such as hay, light corn, meal seeds and dust, and distillers' and brewers' grains. In proportion as the dairy is nearer to, or at a greater distance from large towns, the price of the food will be higher or lower ; and the expence of carrying the produce to market may be either so small, as to make this branch the only object, or so great, as to render it no more than an occasional or secondary one. In the latter case, the

price of food will be much the same as for other cows kept chiefly for rearing calves, or for a cheese dairy, which will be noticed under that head; and in the former, nearly as high as the expence of feeding cows in towns, which has been already stated.

3. The management is different from that of town dairies. It is no part of the cowkeeper's object to sell his cows to the butcher, and, instead of purchasing once a-year or oftener, he usually breeds from them for several years, and either sells the calves as they are dropped, or rears and fattens them according to circumstances. In this and other respects the management is the same as in the case of a cheese dairy, to be afterwards described.

4. The produce of these cows in milk cannot be expected to be so great as in town dairies, because they are not so highly fed, and must be dry from two to three months before calving. Another reason for an inferior average produce from a dairy of this kind is, that a part of the stock will generally consist of young cows that have brought their first calf, and it is well known that these never give so much milk as the older ones. From the survey of Renfrewshire, it would appear that the average quantity of milk may be about 1200 Scotch pints, or 2148 English quarts. In other publications almost double this quantity is said to have been sometimes obtained, and there is no doubt that such extraordinary returns have been made by a few cows; but the best managed dairies have never averaged nearly so much. It will be fully high enough to estimate the returns from a dairy of this description, consisting of cows of different ages, at from 1200 to 1500 Scotch pints *per* cow in nine months. A little milk may be sometimes got in the tenth month, which may raise the produce through the year, averaged upon nine months, to about 5 Scotch pints daily, or 1370 in all. This is at the rate of nearly 9 quarts English wine measure *per* day, for that period.

5. The quantity of butter obtained from this milk must de-

pend a good deal on the breed of the cows, and the quality of the pastures and winter food. They are seldom or never fed on rich old grass, and the greatest milkers do not give it of the best quality. The common calculation near Edinburgh, is that 10 Scotch pints give 22 ounces avoirdupois of butter, though there are several instances of a greater produce*. In the western counties, it is said that 8 Scotch pints will yield the same quantity. If the average is taken at nine pints for 24 ounces, or one pound and a half avoirdupois, the butter that may be made from 1370 pints will be a fraction more than 228 lbs. The present price of butter in Edinburgh market is from 1s. 6d. to 1s. 8d. *per lb.* of 22 ounces, which is near 1s. 2d. *per lb.* avoirdupois.

The value of 228 lbs. butter at 1s. 2d. is	L.13	6	0
1370 pints butter-milk at 1d. -	L.5	14	2
One-fifth water at 1d. - -	1	2	10
	<hr/>		
		6	17 0
Calf, when dropped, - - -	-	0	10 0
	<hr/>		
Amount of produce <i>per cow</i> ,	L.20	13	0

Which is a little more than threepence halfpenny *per pint* of sweet milk. It has been said, that milk used in this way pays 4d. *per pint*, but in that case the butter and butter-milk must be either sold higher, or more water must be put into the butter-milk. Butter, indeed, sometimes sells at a penny or two-pence a pound more, at particular seasons, but not at an average of the whole year.

6. The whole milk is churned in these dairies, and not the cream only. "As to the quantity of butter, churning the milk is the most productive; but with regard to the quality, there is not a doubt that if made from the cream only, the butter will be considerably richer, and the taste and flavour higher, provided due attention be paid to keep the vessels

* Mid-Lothian Report, p. 149

clean, and proper care be taken to churn it when in the best state *." The butter made from cream, however, is apt, when salted, to lose its good flavour sooner than that made from milk.

7. With regard to the process of churning, the following particulars deserve attention : they refer to the practice near Glasgow, where the management is as correct as in any part of the kingdom.

The milk, when drawn from the cow, is placed in coolers about three inches deep, and stands from twelve to twenty-four hours, till the cream has risen to the surface. The coolers are then emptied into a stand-vat, where the milk remains till churned. If another milking is ready to be placed in the stand-vat, before the former has begun to acidify, the second also may be put into it ; but if the first has soured, or is approaching to it, such admixture would lead to fermentation, and injure the milk. The utmost care is always taken not to allow the *coagulum* of the milk in the stand-vat to be broken, till it is about to be churned. If the house is of a proper temperature, the milk may stand from a day to a week without injury, till as much be collected as it may be convenient to churn at a time. No milk is ever churned till it has acidified and coagulated.

The operation is generally performed in plunge-churns of considerable size,—some of them, containing 120 Scotch pints, are worked by a single person ; and when machinery is applied, 150 or 200 pints are churned at a time. In a few minutes after the operation begins, as much warm water is poured into the churn as raises the temperature of the milk from 50 to 55 degrees of Fahrenheit, (being that of the dairy-house), to 70 or 75 degrees ; the churning always going on while the water is slowly poured in. The milk will admit of a greater proportion of water in autumn when it is rich, than in spring when it contains more serum. Probably

* West-Lothian Report, p. 166.

one pint of water may generally be added, one way or other, to every 5 or 6 pints of milk in the early part of summer, and 1 to 4 or 5 in harvest and winter. The inhabitants of Glasgow have complained loudly, and probably not without cause, of the butter-milk sold in the streets of that city being too much adulterated with water; though a certain proportion is considered indispensable, both for raising the cream and facilitating churning.

When milk is either overheated, or churned too hastily, the butter is always soft, and of a white colour. From two to three hours is a proper time for performing the operation of churning. In the manufacture of sour-milk, and in every branch of dairy husbandry, the utmost attention to cleanliness is indispensably necessary.

It has been already observed, that the expence of feeding the cows, carriage of milk to market, &c. must vary, according to the distance of the dairy from the towns where the butter and butter-milk are sold. Two or three miles will occasion a great difference in the rent of pasture, and in the price of turnips, potatoes and other food. Unless, therefore, any particular distance were specified, and these prices ascertained, the neat profit *per* cow cannot be estimated; and whatever data might be given or assumed, the result would not apply to any other situation. It is probable, from the expences of a cheese dairy, which shall be afterwards stated, that fourpence a-pint for sweet milk, which seems to be its utmost value when converted into butter and butter-milk, leaves but a very small profit to the dairyman, after all charges are defrayed. In the Renfrewshire Report, it is stated, that a practice prevails in some parts of the county, to let cows for the whole season at L. 13 or L. 14 *. This seems to be a high-enough rate when the milk is converted into butter and butter-milk, as it amounts to two-thirds of the value of the whole produce. But much higher prices have been paid, when it

* Renfrewshire Report, p. 144.

can be sold as it comes from the cow near large towns, where it brings 6d. and sometimes 8d. a-pint. In such situations, cows have been let out at the rate of a guinea a-week each, as already mentioned.

2. *Butter and Skimmed-milk Cheese.*

1. This method of manufacturing milk is common in almost every part of Scotland; whatever may be the breed of cattle, a portion of their milk is applied to this purpose.

2. Their food and management are regulated by the circumstances of every different district. The milk of the small kyle as well as of the largest short-horns, is converted into butter and cheese; but these articles, however valuable, are only of secondary importance with the breeders of both kinds, and little affect their general management. On farms of every description, even where no cattle are reared, a few cows are kept for the supply of the farmer's family and servants, from which butter and cheese are made; and a great deal of both is produced from the cows of hinds or married farm-servants. Unless in large towns, butter-milk cannot be sold, and there is but little demand for fresh butter. Instead, therefore, of churning the whole milk, the cream is taken off, and made into butter, and the milk itself into cheese, both of which may be sent to a distant market, or kept till wanted for home consumption. Part of the whey is used as food, and the remainder applied to the feeding of pigs.

3. It is unnecessary to repeat what has been said concerning the process of churning; and the method of making sweet-milk cheese, to be described immediately, will apply to the best mode of making skimmed-milk cheese also. It only remains to compare the value of the butter-milk with the skimmed-milk cheese and whey.

The quantity of milk has been already estimated at 1370 Scotch pints, producing 228 lbs. butter from each cow yearly. The weight of skimmed-milk cheese is usually reckoned at twice that of the butter, and will bring two-thirds of the price

of sweet-milk cheese. The whey for feeding pigs was valued at one farthing for two Scotch pints in 1795 * ; but calculating the average quantity given to each pig, (16 pints daily), and the weight of pork produced, the whey will not be too high rated at one farthing a-pint, when pork sells at 6d. *per* pound. The comparison between the value of butter-milk and that of skimmed-milk cheese and whey, will therefore stand thus :

456 lbs skimmed-milk cheese, at 4d.	-	L. 7 12 0
1370 pints of milk ; deduct 1-5th abstracted by butter and cheese, leaves 1096 pints, at $\frac{1}{2}$ d.	-	1 2 10
		<hr/>
		L. 8 14 10
Value of butter-milk as before,	- - -	6 17 0
		<hr/>
In favour of skimmed-milk cheese,	- -	L. 1 17 10
Add the produce <i>per</i> cow of butter-milk dairies, as before,	- - - -	20 13 0
		<hr/>
Total produce <i>per</i> cow of a butter and cheese dairy,		L. 22 10 10

But it is understood, that more butter is obtained when the whole milk is churned, which may equalize the profits of the two methods. The expences of both may be nearly the same ; for though the butter-milk must sometimes be carried a few miles, there are charges for cheese-making, as well as for some capital, risk, and attendance on the pigs fed.

4. It must be observed, that as butter and cheese are the articles into which the surplus milk of every breed of cows in every situation is converted, no such average returns *per* cow, as have been estimated for butter-milk dairies, can be calculated on. In some parts of the Highlands, one calf is allowed the milk of two cows till it is weaned, and the

* Mid-Lothian Report, App. p. 54.

produce afterwards is stated at no more than 22 lbs. of butter, and 48 lbs. of cheese *per* cow. A well-fed cow in the Lowlands, after rearing her calf, may produce ten times as much of both butter and cheese.

§ 3. *Cheese Dairies.*

Sweet-milk cheese, or Dunlop cheese as it is commonly called, is made in several parts of Scotland; but this manufacture is carried to the greatest extent, and conducted most systematically in the county of Ayr, and parts adjacent. The following observations are therefore to be understood as applicable to the practice of that district.

1. The breed of the cows has been already described; and they are exceedingly well adapted to a dairy, both from the quantity and the quality of the milk which they yield. A good judge would no doubt point out several defects in their form and proportions, if he compared them with the best breeds reared for fattening; but so little is this the object of dairy farmers, that when any of their cows has missed the bull, she is immediately disposed of, sometimes at scarcely one-third of the price paid for another to supply her place. Milk being thus so much more valuable than beef in their estimation, there is not much attention paid to the best form and properties for fattening. It has been long, indeed, a doubtful question, whether any breed can be formed, that shall be equally valuable for both purposes.

2. The food of these cows in summer, is pasture of a medium quality, growing for the most part on a clayey soil, and under a moist climate. By several farmers, they are partly fed on cut grass, though this is by no means general. In winter, till they drop their calves, they have oat-straw or bog-hay, with what they can collect on the fields, to which they are turned out every day, unless the weather be very stormy, to the great injury of the land, as well as of the cattle. After calving, they get chaff, light corn, colewort, turnips or potatoes, with a little hay till they go to grass. The

great error of the dairy farmers, is, their inattention to the culture of turnips; very few are raised by the generality of farmers in the districts to which dairy husbandry is in a great measure confined, and the few that are raised, are not preserved as they ought to be, but usually consumed, at the end of the grass season, for the purpose of protracting the milk a few weeks longer. The consequence is, that the cows often come to grass in spring, or the commencement of summer, miserably emaciated, and a great part of the best of the season is gone, before they get into such condition, as to yield the quantity of milk which they would otherwise give at the outset.

3. The management of these cattle, in other respects, is not very different from that of other cows kept on arable lands. On well inclosed farms, they are kept out both night and day, from May till about the end of October, and brought into the byre twice a-day to be milked; but towards the moors, and wherever the land is not completely inclosed, they are put under the charge of a herd through the day, and brought to the byres at night.

The best managers never put their cows on the pastures during winter, nor until the grass has risen so much as to give a full bite in May. If a drought injure the pasture, or when the weather is very hot, they keep the cows in the house during the greater part of the day on clover and rye-grass, and turn them out to pasture in the cool of the evening, where they remain till eight or nine o'clock next morning. When the pastures begin to fail in autumn, they feed with the aftermath of clover in the byre, or with the smallest of their turnips strewed over the pastures. In winter, the cows are regularly fed with turnips and straw, and in spring with potatoes and hay until the return of the grass season. The expence of this mode of management will be afterwards estimated.

Some of their cows are allowed to bring calves when only two years old, which is a practice destructive of their future growth and value. A young cow of even three years, never gives so much milk with her first calf as afterwards. No more

calves are reared than are necessary for keeping up the stock, and supplying the place of the old ones that can be kept no longer. The greater number of calves dropped in winter and spring are fattened for veal, as the price is then high, and the milk not so abundant, nor the weather so favourable for making cheese. When cheese-making commences in May, the calves that are dropped afterwards, are generally sold to the butcher, before they are a week old. But attentive managers take care to have nearly all their calves from the 1st of March to the 11th May*.

4. The produce in milk of the *best* managed dairies, will not exceed what has been already stated under the head of butter dairies. The usual estimate is, that 55 Scotch pints, (98½ quarts) give 24 lbs. or one Ayrshire stone of cheese†, so that if the whole milk is converted into cheese, there would be produced from 1370 pints, (2453 quarts) nearly 25 such stones, or 600 lbs. avoirdupois. The price paid to the farmer for this cheese has varied of late years from 10s. to 12s. and 13 s. a-stone. At 12s. or 6d. *per* lb. avoirdupois, the value of the cheese will be L. 15 for each cow. The value of other articles and the expence shall be brought into one view at the end of this article.

When such a number of cows are kept as to yield milk sufficient for a cheese of tolerable size, at every milking, it is passed through a sieve (provincially termed a *milsey*), to re-

* Butchers and others, who purchase young calves in the west country, and carry them to towns to be slaughtered, do not, as in England, transport them standing on their feet in carts, tied so as to prevent them from falling by the jolting of the cart, but hang such of them as cannot travel, in pairs, by the feet, over a horse's back, with their heads hanging down, three or four pairs on one horse, and the driver sitting for many miles above the whole. Others heap as many living calves into a cart (all tied by the feet), as make a load. The cries of these tortured animals, carried so far, in so cruel and painful a posture, ought to excite the notice of the police of the country.

† Some think, that 5 choppins, or 2½ pints, equal to 4½ quarts nearly, are required for every pound avoirdupois of sweet-milk cheese, or 60 Scotch pints for a stone of 24 pounds.

move impurities, into a boyne or vat, and formed into curd by a mixture of runnet. As milk requires to be coagulated as nearly as possible at its heat when drawn from the cow, and as it must cool somewhat in milking and passing through the sieve, it is necessary to pour a quantity of warm water into the milk in the curd-vat.

Where the cows on a farm are not so numerous as to give milk sufficient to make a cheese every time they are milked, the milk is stored about three or four inches deep in coolers, till as much is collected as will form one of a proper size. When the cheese is to be made, the cream is skimmed from the milk in the coolers, and, without being heated, is passed through a sieve or drainer, along with that which is drawn from the cows at the time, into the curd-vat; and the skimmed milk being heated so as to raise the temperature of the whole mass to about blood-heat, and also passed through the drainer to separate every impurity, the whole is coagulated by runnet, carefully mixed with the milk. The cream is put into the curd-vat cold, that its oily parts may not be melted. The utmost care is always taken to keep the milk clean in every stage of the operation, and to prevent its becoming sour, which, when it happens, greatly injures the cheese.

The temperature at which the milk is kept, from the time it is drawn from the cows, till it is formed into cheese, ought to be carefully attended to. To make it cool, and to facilitate the rising of the cream, a small quantity of cold water is generally poured into each cooler. If kept much warmer than 55 degrees of Fahrenheit, it will not properly cast up the cream,—a thing necessary, even when the whole is to be formed into cheese; and it will very soon become sour. And if it gets into a lower temperature, the cheese acquires a pungent unpleasant taste, which cannot be afterwards removed; the milk never again coagulates nearly so well, and the cheese made from it is soft, inadhesive, and the whey is separated with difficulty. It is not enough that the temperature be raised to the proper degree when coagulated; if it has,

prior to that, become too cold, the heat at setting the curd will not do away the bad effects of the previous cold. It is owing to the milk being allowed to cool too much before it is coagulated, that it becomes difficult to get it formed into cheese in winter, and that the cheese made at that season is so soft and tasteless.

With regard to the temperature of the milk at the time it is formed into curd, the rennet should be applied when the milk has been raised to animal heat. If coagulated too warm, the curd becomes tough, harsh, and too adhesive: much of the butyraceous matter is melted and carried off with the whey; and the cheese becomes hard and dry. And if the milk is too cold when coagulated, the curd is soft, does not part with the serum, and the cheese can with difficulty be kept together; and even when the utmost pains are taken to extract the whey, and give it solidity, putrifying holes, which in dairy language are termed "eyes," or whey drops, will break out in the cheese.

It is the practice in some of the English dairies to set the curd at a low temperature, to avoid melting the butyraceous substance; and whenever the curd is broken, and the whey begins to be separated, the whole is heated by throwing on boiling water; or the milk is coagulated, in a boiler, to which fire is applied. It has been found, that the oily matter does not melt so easily after the curd is set. But this is neither generally known nor practised in Scotland.

The only rule for determining the temperature of the milk is the finger-end of the dairy-maid, and very little attention is paid to it except when the rennet is applied. It is chiefly owing to this, that two cheeses are seldom of the same taste and consistence, even when made by the same person. In England, where every thing is regulated by the thermometer, the cheeses are much more uniform in taste, colour, and consistence.

Whenever the milk has coagulated, the whey is drawn off as fast as possible; and to facilitate its separation, the curd is

minutely broken or cut with a knife. If the curd has been too cold when coagulated, some hot water is poured on it, and cold water when it has been coagulated too warm. When the whey has been mostly extracted, the curd is put into a drainer, and again cut and pressed to expel it more completely. It is next broken small, minutely mixed with salt, and put into the cheese-vat, with a piece of thin canvas round it, and pressure is applied till the whey is wholly extracted, and the cheese formed. It remains the first time about an hour, and afterwards three or four hours each time, in the press, getting a clean and dry cloth, and its position being reversed every time it is changed. Skewers are never put into the sides of the cheese to extract the whey, as is common in England.

Some have of late shortened the process of pressing, by placing the cheese, when it comes from the press for the first time, into water, heated to about 95 or 100 degrees, where it remains till the water becomes milk warm. It is then dried well, and again placed under the press.

Salt is generally applied without measure or weight, but it ought to be used at the rate of half an ounce to every English pound of cheese, or 13 ounces to 24 lbs. Too much salt renders the cheese dry, tough, and hard, and without enough it will soon acquire a putrid taste.

When cheeses come from the press, they are exposed for about a week to a considerable degree of drought, and turned over twice every twenty-four hours, and afterwards laid on boards in a close cool room, and turned over twice a-week. The mode of sweating cheeses after they come from the press, and before they are laid up to dry, so common in England, is not approved of, nor practised in Scotland, from an idea that it impoverishes the cheese, by melting part of its fat. Yet the Scotch cheeses do not crack in the skin, except when the milk has begun to acidify before being coagulated, or when they are exposed to too much drought at first. *Whey springs* or *eyes* are seldom found in the cheeses of Ayrshire.

They very rarely *hove* or *fire fang*, and wooden hoops or swaddling belts are not used in Scotch dairies. The cheeses are sometimes coloured by an infusion of annatto, but the practice is far from being common.

The Scotch cheeses have not so high a flavour and spicy taste as some of the English, owing perhaps to the inferiority of pasture, and to the greater pains taken in the English dairies to give the cheese a smart acrid taste *.

All the operations are carried on in Scotland by women. Men would think themselves degraded were they to assist in milking the cows or making the cheese. This prejudice ought to be removed, as it has been already in a few instances. Nothing can be more unreasonable than for females to be oppressed with this severe labour twice a-day, while the men are frequently all the time lounging idly.

The implements used in the Scotch dairies are chiefly made of wood. In some the coolers have been made of stone, and in others of lead; and recently Mr Baird of Shotts iron-works, near Whitburn, has formed them of iron, tinned within, which seems to be a very great improvement. The milk cools sooner in them than in wooden vessels; and as they are portable, easily cleaned, and very durable, they appear to deserve a preference to all others.

The cheese presses are of various constructions. But the most common are stones of from 10 to 18 or 20 cwt. fixed in a frame to keep them erect, and they are raised and let down by a strong screw. Others are formed on the principle of the lever, either simple, or the power multiplied. But a particular description of the dairy implements, as well as of the necessary buildings, belongs to other chapters of this work.

6. It may now be desirable to exhibit a statement of the expences and produce of a cheese dairy.

* *Vide Ayrshire Report*, 450. *et seqq.* from which this account of cheese-making has been extracted.

Produce per cow.

1370 pints of milk, yielding 600 lbs. of cheese, at 6d.	L. 15	0	0
Whey 1233 pints at $\frac{1}{4}$ d.	-	-	1 5 8
Calf, - - - - -	-	-	0 10 0
			<hr/>
	L. 16	15	8

Expences.

From 1st November to 1st March, 120 days, 5 stone of turnips at $\frac{1}{4}$ d. and 1 stone of oat-straw $3\frac{1}{4}$ d.	L. 3	0	0
From 1st March to 15th May inclusive, 76 days, 36 lbs. potatoes at 6d. and 1 stone hay at 7d.	-	-	4 2 4
Pasture in summer, - - -	5	0	0
Expences of management, - -	1	6	0
Interest 15s.; insurance or risk, 10s.; loss in value 13s. - - -	1	18	0
			<hr/>
		15	6 4
			<hr/>
Profit per cow,	L. 1	9	4

The weight of food consumed, the expences of management, interest, risk, and yearly loss in value, have been taken from a statement furnished by the owner of perhaps the greatest cheese dairy in Scotland *.

The charge for pasture is that which has been paid for several years in many districts. Two cows giving the quantity of milk calculated on, have been commonly supposed to eat as much grass as three oxen of the same weight. The charge for turnips is at the rate of L. 10 for 30 tons, or one acre of a good crop; for hay L. 4 : 13 : 4 *per* ton, and for potatoes L. 1 : 11 : 1 $\frac{1}{4}$. When the rent of pasture, and the price of hay, turnips, and potatoes, are higher, as they always are near towns, it must be evident that a dairy of this kind would be an unprofitable concern.

* Farmer's Magazine, vol. xiii, p. 460.

With regard to the value of the produce, it may be thought that an addition should be made for the dung. This, however, does not seem necessary, as no charge is made here for litter, nor for the rent of the byres or dairy houses, nor for any interest of money or risk on the pigs fed. The value of the dung will be absorbed by these and other minute and occasional charges, which cannot well be calculated, but which every farmer knows must be incurred. It ought also to be noticed, that cheese-making is understood to proceed for nine months in the year, whereas it cannot be advantageously carried on in the winter months. The calves are not supposed to get any milk, and no allowance has been made for a bull, which must form an article of charge against every such dairy. On the other hand, a little butter may be got from the whey, though there is seldom ever any made from it in Scotland.

The writer is aware, how much calculations of this kind are exposed to objection. Over a great part of the dairy district, the charges are somewhat less than have been stated; and by the common mode of feeding in winter already noticed, certainly must be so. But the produce in that case will be reduced in a greater proportion, from L. 10 to L. 12 *per* cow, being a pretty general estimate. Taking the *best* managed cheese dairies, it is believed that these calculations are not chargeable with any very material error.

It may now be proper to bring under one view, the average produce *per* cow, and the price of milk *per* Scotch pint, when converted into butter and cheese, by the several processes already mentioned :

1. Butter, and Butter-milk dairies, <i>per</i> cow,	L. 20 13 0;	or <i>per</i> pint,	3.62—
2. Butter and cheese, and whey,	- 22 10 10	————	3.95+
3. Cheese and whey,	- - 16 15 8	————	2.94+

The value of the calf is included in these calculations, which, if deducted from the several amounts, would slightly diminish the value of the milk *per* pint. The calf is valued

at the same price in each ; and though young calves sometimes bring 15 s. or 20 s. the far greater number cannot be rated at more than 10 s. on an average, throughout the western counties.

4, *Veal.*

The last method of using milk is, in fattening calves.

Calves are usually fed on milk alone, without any admixture, and they are not allowed to suck their dams, but taught to drink it from a dish. For a week or two after they are calved, they will not be able to consume more than the half of the milk of a good cow. But the quantity must be gradually increased, to as much as they will drink. By the time a calf is four weeks old, it will consume at least the milk of one cow ; and in two or three weeks more, if of a large size, and thriving well, it will take nearly the milk of two cows. It is common to give the young calves, or those that are intended to be reared, the first drawn milk, which is weak, thin, and abounds with serum ; and to such as are fattening, the last drawn milk of two, or perhaps of three cows.

Some have given eggs, and others meal, along with the milk ; but neither of these are approved of, by those who feed calves to the greatest perfection, as they are supposed to darken the colour of the flesh.

The only rules now observed in fattening calves, are, to give them, after the first two or three weeks, *abundance of milk*, to keep *plenty of dry litter under them* in a place that is well-aired, neither too hot nor too cold ; and to *exclude the light*, as they are otherwise apt to become too sportive.

If a calf becomes costive, a little bacon or mutton broth will give it ease ; and if it begins to purge, a small quantity of runnet put into the milk is a good remedy. The practice of bleeding calves, to expedite their fattening, is not approved of in the west of Scotland *.

* Ayrshire Report, p. 441.

A calf well fed till it is eight or ten weeks old, when it may bring from L. 4 to L. 6, probably pays about 4 d. *per* pint for its milk, but it is unprofitable to carry on such a calf much longer *.

II. LABOUR.

This is the next description of the produce of cattle, and in Scotland forms but a very inconsiderable one.

So few cattle are worked in the best cultivated districts, that it is quite unnecessary to treat of this at much length. There is no breed reared with any view to labour; and the few oxen that are ever worked, are chiefly of the short-horned, Fife, and Aberdeen breeds. In the Northern Isles, their very small cattle are also employed in labour.

The comparative advantages and disadvantages of horses and oxen for farm labour, have been the subject of much dispute, in which speculative and practical men have taken opposite sides. To prove the fitness of oxen for all sorts of labour, the former have referred to the practice of both ancient and modern times. The Greeks and Romans, as well as the cultivators of Spain, Hindostan and other countries, have been warmly recommended, as examples worthy of the

* *Corstorphine Cream*.—The following account of a local practice, is extracted from Sir John Sinclair's Statistical Account of Scotland,—Parish of Corstorphine, in the county of Mid-Lothian. "They still prepare for market a considerable quantity of what is well known over the kingdom by the name of Corstorphine Cream. I have not been able to receive any account of the time it was first introduced. I have no doubt but it hath a just claim to a very great antiquity, nor do I know if the same mode of preparation hath been always in use. At present, there is some variation observed. I believe the most approved process is very simple, and is as follows: They put the milk, when fresh drawn, into a barrel or wooden vessel, which is submitted to a certain degree of heat, generally by immersion in warm water; this accelerates the stage of fermentation. The serous is separated from the other parts of the milk, the oleaginous and coagulable; the serum is drawn off by a hole in the lower part of the vessel; what remains is put into the plunge-churn, and after being agitated for some time, is sent to market as Corstorphine Cream."

imitation of British farmers. A few proprietors have supported this recommendation, by their own practice. Still, however, over the greater part of Scotland, it would not be much more difficult to prevail with farmers to lay aside their threshing-mills, and adopt the method of treading out the grain, practised in these countries, than to dismiss their horses, and perform all their labour by oxen.

Many farmers still alive were accustomed to work oxen in their early years, and have laid them aside as an improved system of agriculture was established. Even at the present day, a few oxen are still employed by very intelligent men; and there is therefore no reason to ascribe the aversion of the great body of farmers to oxen, merely to their ignorance. Several farmers who now prefer horses, have had experience of both, so lately, that they could not but know which of them was best adapted for the present modes of management. As it is altogether incredible, that the least expensive instrument should fall into disuse, and be supplanted by another, which is said to be attended with much loss, it must be inferred, that farmers are either altogether incapable of calculation, or that horses are almost universally preferable to oxen for their purposes. Men may for a long time resist innovation, and turn a deaf ear to conclusions obtained from the experience of others. They may continue, for instance, to gratify their propensity for teams of four or six horses, gaudy trappings, and unmanageable waggons. But there has never been an instance of a farmer employing four horses in a plough, after he had found, from several years' experience, that two horses did the same, or nearly the same work, quite as well. Nor is it at all probable, now that the advantages of convertible husbandry have been fully ascertained, that at any after period farmers will ever return to the old arrangement of out-field and in-field.

The advocates for the employment of oxen, have argued the question rather on the ground of national, than private interest. The vast quantities of grain consumed by horses,

would form, it is said, a great addition to the stock of food for our increasing population, and obviate the necessity of importing it from other countries. At the same time, it is alleged, that beef would be more abundant, and of a quality better suited to the consumption of our navy. These considerations do not apply to the individual interest of farmers, and imply a distinction which is inconsistent with every just view of the question. For it might be urged upon the same principle, that it would be a national advantage to substitute the cultivation of potatoes for that of wheat, and to limit the consumption of butcher-meat. If it is for the interest of the farmer to employ horses, and, as long as it is so, it never can be for the advantage of the public, that his ability to raise food should be diminished by the less profitable substitution of oxen. Any measure which should compel him to employ them in opposition to his private interest, such as a very high tax on horses, would have the immediate effect of discouraging cultivation, and of augmenting the already too extensive portion of the country devoted to permanent pasture.

The almost universal preference given to horses, certainly affords a very strong presumption that they are the most profitable labourers; but still this is only a presumption. With a view to a correct decision of the question, it must be known, among other things, what labour is required by a farmer, at the different seasons of the year, according to the nature of his soil, and its condition and situation. Should it be alleged, that every different kind of labour may be advantageously performed by oxen, it will then be necessary to advert to the time of performance, and the advantages of dispatch under a variable climate. An estimate may be afterwards formed of the expence of their labour, and a comparison attempted between it and that of the same labour performed by horses. Several minute circumstances, disregarded by speculative writers, must also be attended to, before any approach can be made to a just conclusion.

As it will be necessary to give an account of the labour commonly performed by horses, in a subsequent section, the farther consideration of this question may be then resumed.

III. CARCASS.

The last description of the produce of cattle is their carcass; but in this place, it is proposed to confine our remarks to the four quarters of the animal, or the produce in beef only.—It will first be necessary to attend to the food and management upon which this article of produce depends.

In Scotland, cattle are fattened in summer chiefly on pasture, and in winter, on turnips of different varieties, and potatoes, with the addition of hay or straw. When grain is allowed to be used in the distilleries, considerable numbers are fattened on the offals of these works.

1. The pastures on which cattle are fattened, are either old rich grass fields, or consist of sown grasses, chiefly red and white clover, and rye grass, which occupy one of the divisions of convertible husbandry. Of the former, there is comparatively a small extent in Scotland, but there is a considerable proportion of the latter, from one half or more, to one-sixth, on every arable farm. The old rich pastures are seldom to be found, except near the seats of proprietors, and are annually let for the season only. In some of the western counties, and in Berwickshire, farmers also find it their interest to preserve a small proportion of such pastures. Of the sown grasses, a large proportion is cut green, and converted into hay; in several counties, the greater part of them is pastured with sheep; and the remainder, in both cases, can seldom be exclusively appropriated to fattening cattle, but must be divided among them and the horses, milch cows, and other stock of the farm. Besides, it is well known, that new grasses do not fatten well, after the period when they would have attained maturity, had they stood for a crop; and that the aftermath or second growth never possesses the nutritive properties of the first.

The result of this is, that few cattle comparatively can be said to be fattened wholly on pasture, or with the assistance of hay, the produce of a part of the same land, as in England. The pastures in Scotland are most generally and profitably employed, either in preparing cattle for being fattened in winter, or in finishing them for the butcher in the early part of summer.

It may be proper, under this head, to notice another method of fattening on grass, which has been attempted in a few instances, viz. by feeding on cut grass or *soiling*. It has been long the practice in Scotland, to feed farm-horses, and occasionally milch cows in this way; and it was thought that cattle might be reared and fattened by the same means.

The practice of soiling young cattle is said to have been long followed in Berwickshire, but is now abandoned, from an idea of its insufficiency to raise stock to the same weight and size, as they would have been raised to, had they been grazed in the common manner *. From young to fattening cattle, the transition was easy and natural; but it does not appear that this mode of fattening cattle was ever attempted in that county, or at least persisted in, and now, “the soiling of cattle is not in use there †.”

Several experiments, however, have been made to fatten cattle by soiling; but they are not so numerous, nor have they been conducted with such accuracy as to lead to any certain conclusions. There is reason to suspect that the cattle make comparatively little improvement after the month of July ‡.—It may just be noticed, that the object of a farmer, in all cases, is to obtain the greatest return in money from his produce, whether it can be carried to market in its

* Sir John Sinclair's Husbandry of Scotland, 1st edit. p. 357.

† Berwickshire Report, p. 385.

‡ See Brown's Treatise on Rural Affairs, vol. ii, p. 163; for an account of an experiment in soiling, which seems to have been conducted with much attention and accuracy.

raw state, or first manufactured by live-stock. It is therefore no objection to soiling, though cattle should not be reared or fattened to so great a weight by this mode, as by pasturage. It is enough, if a greater value of beef shall be obtained from a given quantity of food consumed in this way; which must be determined by further experiments.

2. The usual food of fattening cattle in winter is turnips, white, yellow, and Swedish, in succession, with straw. Hay is seldom allowed, unless when turnips have lost their nutritive qualities, towards the end of the spring months, or are altogether consumed. Potatoes are not extensively used in fattening. Oil-cake and corn have been occasionally employed for the purpose of bringing a few animals to an extraordinary weight or excessive fatness, but they are neither required, and unless cheap, ought not to be generally admitted in the economical system of Scottish husbandry. The grains and dreg of distilleries, at a distance from towns, are also employed in fattening cattle; and when they are prohibited to work from grain, a scarcity of beef, in the spring months, is always felt in those districts where the soil does not permit the extensive cultivation of turnips.

These then are the materials from which beef is produced in Scotland. The next consideration regards the cattle employed as the instrument; how they are managed; and what returns they usually make.

I. Of the varieties that have been mentioned, the Highland breed, including that of the north-eastern counties, is by far the most numerous, and the best suited to the medium pastures of the country. About one-fortieth part only of the Galloway bullocks and heifers is fattened at home. All the mixed breeds of the Lowlands, are either fattened for home consumption, or sent to England, nearly fat; a great many to Morpeth and other markets in the north of England, fully ready for the butcher. The greater number of the Fife breed, are fattened and consumed in that county, or

the counties adjacent. And all the dairy cows of the western counties, and of the Galloway breed, and nearly all the old cows of the other varieties, are slaughtered for home consumption.

II. The small breeds are usually fattened on grass, and the larger on turnips. To give a general idea of their management, it will be proper to attend to each sort separately.

1. The Highland cattle often pass through three different hands or more, before they come to the butcher. They are improved at every stage, by a greater quantity and better quality of food, instead of being suddenly transported from poor to rich feeding; and while each successive owner applies his produce to the best advantage, and receives a suitable return, according to its value, from the advance of price, the consumer at last purchases his beef cheaper, and of a better quality, than if the cattle had been sent to the shambles at any of the intermediate stages*.

The West Highland cattle make this progress oftener than the larger cattle of the north-eastern counties. Many of them are brought to Dumbartonshire and other places, at the age of two and two and one half years, wintered on coarse pastures, with a small allowance of bog hay or straw, and moved to lower grounds next summer. They are then driven farther south, where they get turnips in straw-yards through the following winter, and in April are in high condition for early grass, upon which they make themselves fat in the month of June.

* This succession of pastures is somewhat similar to the fattening, and fallowing stocks of the extensive grass-farms of England;—a system which can seldom be so fully adopted by the individual graziers of Scotland, though changes of pasture, and also a succession of stocks, are always attended to by skilful graziers. This arrangement is analogous to the division of labour in the arts, by which the cheapness and perfection of the finished manufacture are so eminently promoted.

The larger varieties of the north-eastern counties do not leave the breeder at so early an age. They are seldom brought to market till they are three or three years and a half old, and then frequently in good condition for being fattened, either on grass or turnips. A great many of the Aberdeenshire cattle are bought for the straw-yards of the southern counties, get a few turnips through winter and spring, and are either driven to England in April, or fattened at home in the course of the ensuing summer. The Fife cattle, like the other breeds of the Lowlands, are generally sold to the graziers at three years old, having got a liberal allowance of turnips during the preceding winter.

It may be said in general, that these cattle are prepared on turnips and finished off on pasture; and it is of great importance to have them ready for the butcher early in the season, if possible by the end of June, both because butcher-meat brings a higher price till that time, and because new grasses, on which most of them are depastured, do not feed so well afterwards. Their place is occupied by the rearing stock of the farm, or by cattle purchased to be fattened during the ensuing winter.

There are many situations, however, on which turnips cannot be raised at all, and yet a considerable number of cattle must be kept in winter to convert the straw into dung. On other low farms, small Highland cattle are kept all the year for consuming the coarse herbage which the home stock refuse to eat. They are allowed no turnips, and even very little straw, unless the ground is covered with snow. Such cattle can seldom make themselves fat in the following grass season, unless the pasture be very rich. They are, therefore, commonly finished off on turnips given them on their pastures towards the end of autumn, and continued till they can be sold commonly before Christmas. Cows also which have missed calf, and been poorly fed during the winter, must either have a very good pasture, or a few turnips afterward.

though they are very often slaughtered when not more than half fat.

Small cattle are not usually stall-fed in Scotland. Their early habits render them less fit even for the confinement of straw-yards; until they have been kept for a season in the low country.

2. The larger breeds are fattened chiefly on turnips with straw, and are either chained to the stake by the neck, or to staples in the wall by the horns; or kept loose in sheds and fold-yards, divided into small spaces, in each of which two are commonly kept together.

The former is the most general practice. In many feeding houses the cattle are not separated by any partition. The turnips are laid on the floor of the byre,—the wall before them, and a piece of timber raised a little above the floor and parallel to the wall at a distance of 18 or 20 inches, forming the two sides of their crib or trough. The turnips are either given them from behind, or thrown in through an opening of the wall at their heads, which is covered by boards moving on hinges. The first improvement made upon this inconvenient and dangerous practice, was to run partitions or rails of coarse planks between every two beasts, which, in a great measure, prevented a mischievous one from disturbing his neighbours, and permitted two of the same size to be kept together, though at a sufficient distance from each other. The troublesome method of feeding them from behind has been also laid aside; and in the best constructed feeding houses, cattle are now placed at such a distance (from 3 to 4 feet) from the wall, as allows the feeder to pass with their food in a wheelbarrow or basket from one end of the house to the other. Each beast has a separate stone-trough, and racks for hay and straw are placed upon the partition which separates the cattle from the feeder's walk. At one end of the feeding house is a turnip shed, and at the other a straw barn, each having a door which opens into the feeder's walk. The cattle were formerly allowed too little room, not more than

from 3 to $3\frac{1}{2}$ feet, but the double stalls are generally 8 feet wide, which gives sufficient accommodation to two cattle chained to stakes at the opposite angles of the stall. Behind the cattle is a gutter for receiving their dung and urine, which has a gentle declivity either to the urine-pit or the straw-yard, and between the gutter and the back wall there is a passage 3 or 4 feet wide, for littering the cattle and carrying away the dung. Unless they are very large, a width of 15 or 16 feet within walls is found sufficient for every purpose. A more particular description of such buildings belongs to another chapter.

The other method of feeding cattle is in small open sheds, or what in Berwickshire are called *Hammels* or *Hemmels*, with separate straw-yards attached to each, formed by cross walls or racks, and containing room for two, or at most three beasts in each division. The cattle in this way are allowed to walk about, to feed either under shelter or in the open yard, and to change their food at will. Experience shews that cattle fed in this manner are more adapted for travelling to distant markets, than when tied up in close feeding houses. To every shed a water-trough is, or ought to be allowed, and each has a gate for removing the muck. The turnips are given in narrow troughs, and there may be two small boxes or troughs in each of these sheds for oil-cake, or corn, or bean-meal. Hay or straw is given in the racks which are interposed between every two sheds*.

If cattle have not been accustomed to eat turnips, they lose condition for some time at first when confined to the stall. It is therefore a good practice to effect the change from grass to turnips gradually, by giving them a few of the

* For a more particular description of these *hammels*, the reader is referred to Sir John Sinclair's Account of the Husbandry of Scotland, 2d edit. vol. i, p. 24, where he will find an engraving of the sheds and yards belonging to Mr Robertson of Ladykirk in Berwickshire; to the Berwickshire Report, p. 95; and the Farmer's Magazine, vol. vi, p. 132, and vol. viii, p. 271.

latter on their pastures for a week or two. If some beasts that have been accustomed to this root are put among them, they very soon learn to eat from their example. When they are afterwards confined to the stall or hammel, only the bulb of the turnip is given them, the tap-root and fibres being left with the earth attached to them on the field, and the *stems* or leaves cut off when they are brought home, and given to young cattle in the straw-yards. They are fed with turnips, a few at a time, from an early hour in the morning until near mid-day, when they lie down; and again from about two o'clock afternoon till evening. They have usually straw within their reach at all times, and always abundance in the middle of the day, and during the night. When they are fed at the stake, their stalls are regularly cleaned out, at least twice a-day, in the morning and when they begin to feed again in the afternoon, and they are well littered when they lie down at mid-day and through the night. The curry-comb or a substitute for it is regularly in use by careful feeders, and particular attention is paid to keep the animals themselves and their food, as well as their troughs or mangers, and racks, always clean and fresh, and the house free from every offensive smell. For the latter purpose, and also to preserve a proper temperature, there are usually ventilators, which may be opened or shut according to the state of the atmosphere.

To carry on fattening with advantage through winter and spring, it is necessary to have more than one kind of turnips, for the common white kind is not so nutritious in the spring months as some other varieties, and in a severe winter they are much injured, sometimes almost entirely destroyed. As lean cattle, for a few weeks after being put up to feed, eat a great weight of turnips without much improvement, it is thought unprofitable to begin with the richer and more nutritive kinds. The practice, therefore, is to feed during winter with the white globe, which usually produces the weightiest crop; and towards the spring months, to give first the Scotch yel-

low, and then the Swedish or ruta-baga. The specific gravity of the two first varieties, which generally indicates their fattening quality and power to resist the injury of alternate frost and thaw, is said to be from one-sixteenth to one-eighth part less than that of water, the yellow turnip being heavier than the white. The ruta-baga is heavier than water by about two and a half *per cent* *. But the specific gravity of all the different kinds must depend in some measure on their size, and the quality of the soil on which they grow.

There are very few cattle fattened wholly or chiefly on potatoes, though they are often given late in the spring, after the turnips are all consumed. Sometimes they are served up alternately with turnips; and by this mode of feeding, cattle have been found to improve very fast †. An acre of potatoes has been supposed nearly equal to an acre of turnips in the production of beef, but they cost much more in raising, require more dung, and though eaten by cattle, do not return so much manure as turnips. They must also be given sparingly unless steamed, otherwise the consequences may be fatal. But perhaps the chief objection to their cultivation for feeding cattle, is, that the land cannot be thoroughly cleaned by this crop. They must be put into the ground much earlier than turnip, and after the roots are formed, neither the horse nor hand hoe can be employed. They require to be earthed up at a time when vegetation is still vigorous, and the root weeds must therefore remain in undisturbed possession of the soil, till the late period of the season, at which the crop is removed. In other respects also, they are by no means so suitable for all the purposes of a cattle crop as turnips.

Hay is seldom given to fattening cattle along with turnips, except when there is a deficiency of the latter. They are sometimes fed altogether on hay for a few weeks after all the

* Aberdeenshire Report, p. 288.

† Husbandry of Scotland, 1st edit. Add. p. 2.

turnips have been consumed, merely to preserve their condition till they can be turned to grass. It is too expensive an article, and too much land would be required to produce a sufficient supply, to make it profitable, to give any considerable quantity of hay, so long as turnips are plentiful and nutritious.

It has not become a common practice to prepare turnips or potatoes by boiling or steaming, nor to cut straw or hay into chaff for fattening cattle. Both these methods have been tried and approved of, in feeding horses and milch-cows.

III. The *produce* of fat cattle in beef may be considered as depending, first, upon the breed, the age, and condition; and, in the next place, on the kind of food consumed; or it may be desirable to know, first, what improvement is made in every particular breed in a given time; and, second, what quantity of food is consumed by such breed. For though it is impossible to treat separately of the improvement of cattle and the consumption of food, it is well understood, that upon any given quantity of food different breeds will make more or less improvement;—that some of the articles which have been mentioned, are not applied with equal advantage to all sorts of cattle;—and that the age and previous condition of each kind, very materially affect any calculation that might be offered for the purpose of ascertaining the weight of beef returned from any given weight of food. It is also known, that there is a corresponding difference in the quality of the different articles of the food itself, according to that of the soil on which it is produced.

These difficulties may account for the writers of the county reports having declined to enter on such calculations, and they are not to be completely removed without a very great number of experiments, made with all the different breeds of cattle kept on the several articles of food, growing on the same soil, and on a variety of soils. So great indeed is the difference in the quality of the materials, and in the age,

condition, and general character of the machines employed to manufacture them into beef, and this difference is so little perceptible to the senses, or reducible to any intelligible proportions, that an approximation, and not a very near one, is probably all that can be afforded in the present state of agricultural knowledge in any part of the kingdom.

With regard to the produce of each particular breed, so far as depends on its own general properties, and without any immediate consideration of the kind or quality of its food, the following circumstances would seem to require attention :

1. The annual increase of weight till the cattle are put on fattening food. From the survey of Galloway, and the statement of eminent breeders and graziers of that district, it would appear that the Galloway cattle kept on good pastures in summer, and merely preserved from falling off in winter, will weigh at the age of from two years to two and a half, 30 stones; from three years to three and a half, 41 stones; and from four years to four and a half, 54 stones, thus gaining 11 stones between the two first periods, while they are growing in size, and 13 stones between the two last, when they are fattening. Almost all these several additions are gained during the six months of the grass season*. An ox in the county of Kincardine gains weight in nearly the same ratio, or at the rate of about $11\frac{1}{4}$ stones yearly, after it is a year old, at the age of four years weighing $51\frac{1}{4}$ stones. The feeding is probably much the same as that of the Galloways, or perhaps a little better in winter†.

2. The time required for fattening. This must depend in a great measure on the age, and previous condition, in connexion with the abundance and quality of food. None of the Scottish breeds, if brought from coarse pastures, and only in store condition, can be thoroughly fattened on turnips

* Galloway Report, p. 248.

† Kincardineshire Report, p. 580.

in less than six months; and straw-yard cattle that have got no turnip, will seldom fatten on pastures in a shorter period. They do not often reach a profitable degree of fatness until they have been kept a month or two on grass, in the former instance, after turnips, and as long on turnips after grass, in the latter. But, as has been already observed, cattle are seldom put to fatten on turnips till they have been advanced beyond a store condition on grass, nor on good feeding pastures in the earlier part of the season without having been prepared by turnips. It is not often that large cattle are thoroughly fattened, by either grass or turnips alone, but partly by both, and in a less or greater degree by each, according to circumstances. Spayed heifers fatten more speedily than oxen of the same breed, but do not attain an equal weight; and even old cows but recently in calf, and thoroughly dry of milk, are understood to fatten sooner than oxen, if the previous condition of both has been nearly the same, though they consume more food, and their flesh is of inferior quality.

3. The weight gained while fattening. This, it is evident, must chiefly depend on the animal's disposition to fatten or to grow in size. It has been already noticed, that it is the character of some breeds, such as the Galloway, to mature at an early age, but that they cannot be raised to so great a weight as others,—the breeds of the north-eastern districts, for instance, which do not attain maturity so early. Generally speaking, an animal of a proper age, and well fed, will, in about six months, add from one-fourth to one-third to the original weight of its four quarters.

Of the quality of the beef of the native breeds of Scotland, a general account has been already given; and with regard to the proportion between the weight of beef and offals, though that is somewhat different in different breeds, and even in different animals of the same breed, according to their degree of fatness, it is only necessary to observe, what is universally known, that the proportion of offal is not greater

in the West Highlanders and Galloways, than in the most improved large breeds, while their flesh is laid upon the most valuable part of their carcase.

To ascertain the comparative value of different varieties for fattening, other circumstances than such as fall under the view of the grazier require to be attended to. It has been justly observed, that "a plain coarse ugly animal may pay him more than a fine well made one, because he buys the coarse one at a much less price in proportion *." In order to determine the merits of different breeds, it seems necessary that experiments should be made with them on the same kind of food, the produce of the same land, and be *continued from their birth until they are slaughtered*. The quantities consumed should be carefully noted, as well as the improvement of the cattle at different periods. It is not known that any such experiments have been made in Scotland.

With regard to the weight of beef returned from any given quantity of food, by the *Scotch breeds generally*, perhaps the best *datum* is the price paid for the food, added to the profit of the feeder. To these two sums the value of the beef and offals gained must be equal. In this general view, the most profitable breed, and the most suitable age and condition, must be assumed from the practice of those who both purchase the cattle and the food, however inaccurate such a criterion must be in estimating the comparative merits of different breeds.

The age and condition at which cattle are put to fatten have been already noticed. There are very few kept in Scotland as store beasts beyond the age of four years, except breeding-cows, working-oxen, and perhaps a few stocks of the Highland breed, which are stunted in their growth by the poverty and scarcity of their early feeding. The smaller cattle are usually fattened off on grass when four or four and a half years old, and the larger kinds at four years, or a few months sooner.

* Culley on Live-Stock, p. 180.

With regard, then, to the price of the food on which cattle are fattened, it will be sufficient to attend to that of feeding pastures and turnips. As the former are commonly let by auction for the season, it would seem possible to give the average *per* acre, by comparing the rents for several years of land of different qualities. But the result is affected both by local circumstances, and by the state of the cattle market. The renter of these pastures must take into account the price *per* stone of the lean cattle which he must purchase, and the probable price of fat when he may send them to the shambles. Many breeders, too, in a dull market, are in use to hold on in hopes of a rise, and in a late spring have scarcely any other choice, to prevent their stocks from perishing. Still, however, on an average of years, the beef produced from such pastures must be equal in value to the rent and the common profits of trade. It is probable, that good feeding pastures throughout Scotland may average about L. 4 *per* English acre, to which must be added, on the principles of the property-tax, a profit of L. 2 to the tenant. Such land must therefore produce beef and offals to the value of L. 6 *per* acre.

Turnips as well as grass are often sold for fattening, but more commonly for being consumed by sheep than by cattle; and as they are eaten by the former where they grow, which greatly ameliorates light soils for the ensuing crops, the price is not so high for sheep as for cattle feeding. In many instances, turnips have been sold for feeding cattle at L. 10 and upwards *per* Scotch acre, or L. 8 the English, and this year L. 7 an acre is given for sheep-feeding. It will not therefore be too high to estimate an acre of turnips of thirty tons for feeding cattle, at L. 8, to which L. 4 must be added, as in the former case, for the profit of the feeder. The owner of the turnips indeed usually gives straw along with them, and provides a feeding-house and victuals for the person who attends the cattle, but these are compensated by their manure. An acre of good turnips should therefore produce beef and offals to the value of L. 12.

ON THE LIVE-STOCK

To calculate from these *data* the quantity of beef returned from an acre of good pasture and turnips, two circumstances deserve attention, first, the price of beef per stone sinking the offals; and second, the difference, if any, between that and the lean price.

With regard to the price of beef, it must be observed, that it not only varies in different years, but at different seasons of the same year. From the beginning of April to the middle of June it is commonly from 10 to 20 per cent. higher than during the rest of the year. About the latter period sheep and lambs begin to come to market in such numbers as to reduce the price of all kinds of butcher meat considerably; and this depression commonly continues till Christmas, when prices again begin to rise. Taking the average of several years past, beef may be rated at 8 s. per stone sinking the offals, though it has been lately somewhat more.

A similar fluctuation takes place in the lean weight. In the great penury of fodder in 1807, there were some cattle sold in the county of Kincardine as low as 1 s. a stone. In 1792, graziers in the same county gave 6 s. 8 d. In some years, it has been as high as 10 s.; and in October 1808, it was getting up to 8 s. all per stone Amsterdam, or 14 stone avoirdupois*. The highest prices are calculated on beasts only half fed. At the late markets of Falkirk and Edinburgh (October and November 1813), cattle in good condition sold at the rate of 10 s., or 8 s. a stone avoirdupois, which is just the same as the average price of fat beef already stated.

If the lean and fat prices per stone are equal, the added value of the animal must be owing to weight gained; pasture producing L. 6 per acre, when beef sells at 1 stone, sinking the offals, must return 15 stones, or 210 avoirdupois. This is only one stone less than an good feeding pasture in Berwickshire has been estimated to return†, by a different mode of calculation, and this

* Kincardineshire Report, p. 382.

† Berwickshire Report, p. 327.

greement serves to confirm what is certainly doubtful in the *data* assumed here.

By the same mode of calculation, an acre of turnips yielding a return of L. 12, should produce 30 stones of beef, or double the weight returned by pasture. At 30 tons an acre, this is just one stone *avoirdupois* of beef for every ton of turnips. If an ox of 60 stones the four quarters, after being fed twenty-four weeks, adds 20 stones to his weight, and sometimes, at an average, about 20 stones daily, of white, yellow, and Swedish turnips in succession, or about one-third of his original weight, the proportion between the food consumed and the beef returned will be nearly the same. It is probable that as he gains weight, and advances in fattening, he will eat less in proportion to his weight than at the first, and certainly much less of Swedish, than of common turnips*.

It is probable, however, that neither the average of good feeding pastures, nor turnips of the weight specified, produce quite so much beef, for the following reasons: 1. The profit of the feeder is too high rated at half the rent of pasture, or half the price of turnips; one-third may be nearer the truth. This would reduce the value of beef from pasture to L. 5:6:8, equal to nearly 186½ lbs. and that from turnips to L. 10:19:4, or 373 lbs. Second, there is generally a difference in price, in favour of the fat weight; and to that extent, whatever it may be, beef has not been added to the original weight, though that weight has been rendered more

* From some experiments that were confined to the common white turnips, it has been estimated that 34 tons produce 436 lbs. of beef and tallow, which is nearly 13 lbs. per ton. But then the feeding having been calculated to continue five months and a half, without any succession of yellow or Swedish; the turnips must have lost much of their nutritive properties for several weeks towards the end of the feeding season. At the same time, it was ascertained that a beast of 4½ stone ate 16 stone of white turnips; and one of 50 stone, only 12 stone of Swedish; so that taking the average of the three kinds of turnips, one ton may fully return 14 lbs. or 1 stone of beef and tallow.

receives rather more than a sixth part of the price paid for the barley from which they are produced.

To the owner of the cattle, it is evident they must be of greater value; for, besides enabling him to pay this price, the value of the beef, tallow, and other offals produced, must cover all his expences, and yield him a fair profit on his capital. Instead of going into minute calculations to ascertain the amount of these charges, it may be sufficient to estimate them, as in the case of the grazier, by the price he pays for the food. The distiller's situation is analogous to that of the proprietor of feeding pastures, and the owner of the cattle is entitled to at least as great a profit as the grazier. The twelve guineas which he pays for each stake, should therefore return him eighteen, which, for 120 stakes, is L. 2268, or more than one-fourth part of the price of the barley.

It now only remains to compute, from these *data*, the weight of beef produced from the offals of 4500 quarters of barley, and then the produce from one acre of barley.

Estimating beef at 7 s. a stone, sinking the offals, which is as much as it sold for, previous to the late prohibition of the use of grain, when stakes were let at a guinea a month, L. 2268 will be equal to 6480 stones of beef; and taking the produce of an acre of barley at 36 bushels, or $4\frac{1}{2}$ quarters, 1000 acres will produce the whole quantity of barley from which this beef is obtained. The beef produced from one acre of barley therefore, is nearly 91 lbs., of which two-thirds, or $60\frac{2}{3}$ lbs. correspond to the rent of grazing land, and the other third to the profit of the grazier. At the present price of beef, 8 s. a stone, this would pay to the proprietor of the land, if in grass, a rent of 35 s. an acre, and the half of that to the occupier as profit.

The produce of beef from an acre of good feeding pasture, rented at L. 4, has been already estimated not to exceed 200 lbs. According to this proportion, pasture land at 35 s. an acre should not be calculated to produce more than $87\frac{1}{3}$ lbs. instead of 91. But it may be made a question, whether

land, which, when in pasture, can afford no more rent than 35 s. an acre, and produces only 87½ lbs. of beef, would, when in tillage, give 36 bushels of barley; or whether land, which will carry such a crop of barley, could be got, under any circumstances, at 35 s. an acre. But there is much land in grass, that does not return more meat *per acre*, which, under good management, would yield 4½ quarters of barley; for many suitable soils for barley are very unfit for being long in pasture. And with regard to the rent of such land as would produce that quantity of barley, it is not probable, after all expenses are defrayed, that much more could be afforded when barley sells at 5 s. a bushel, the price formerly stated, so as to leave the occupier the profit which he is supposed to receive from the land while in grass.

It would seem to follow from this, that grass lands, which do not yield more rent than 35 s. an acre, do not produce to the proprietor, or the occupier, a greater income, or to the consumer, more animal food, than the distiller and owner of the cattle obtain for themselves and the consumer, from the offals of a barley crop growing on land of the same quality, when used in distillation.

The quantity of grain that should be consumed by a still of any given contents, and the contents of the stills which may be required for the supply of the market with spirits, do not require to be estimated. Whatever may be the consumption, the value of the offals for feeding cattle cannot be very different, it is believed, from the proportion already stated, both in regard to the number of cattle which may be fed from the offals of a given quantity of grain, and their value in comparison with that of the barley. Should barley continue steadily above 30 s. a boll or 40 s. a quarter, a corresponding advance may be expected in the price charged for the offals.

Upon the whole, these statements regarding the produce of cattle, or rather of the materials which are employed in the production of beef, must be understood, as they are in-

tended, merely as probable approximations, in the absence of actual experiments. A series of well-conducted experiments is much wanted on this important subject, as well as on many other branches of husbandry; and unless experimental farms shall be established in several different situations, this desideratum is not likely to be soon supplied. No individual farmer, acting with a just regard to his own interest, can be expected to undergo the expence, or devote the time and minute attention that would be required; and the few experiments of this kind, that have been occasionally made by great proprietors, have been conducted and reported by men, whose accuracy was not ensured by the personal superintendence of their employers. In the mean time, as the conversion of the raw produce of our soil into the food of man, is, in such a country as Britain, a subject of the highest importance, it was thought desirable to direct the attention of the public towards an inquiry, for which the present materials are confessedly scanty and inadequate.

SECT. IV.

OF THE DISTEMPERS OF CATTLE.

IT is unfortunately impossible, in the present state of our knowledge, to treat of this department in a satisfactory manner, though it is one of very great importance. The greater number of the distempers of cattle in Scotland are occasioned by improper management, particularly by over-stocking in summer, and the scarcity of food in a severe winter and late spring. Such as originate in other causes, are not, comparatively speaking, either frequent or fatal. This may serve to account for the little knowledge that has been obtained on the subject, though it will not justify the too general neglect

of the study. At a time when the attention of men of the highest rank, and of the greatest scientific attainments, has been directed to the improvement of agriculture, it may be justly expected, that the anatomy of the inferior animals,—their diseases,—and the best means of prevention and cure, will no longer be neglected.

All that is proposed in this place, is, to bring together a short account of the most common distempers noticed in the several County Reports, and of the methods of cure which are usually employed. In doing this, little regard need be paid to classification, nor is it necessary to attempt any minute investigation of their causes.

1. The earliest disease to which cattle are liable, is called by the several names of the *navel-ill*, *liver-crook*, *strings*, and *cords*, though probably disorders somewhat different are meant by these terms.

The *navel-ill* “is an inflammation of the navel-string, that takes place between the third and the tenth day*,” and is commonly fatal. It is said to have been prevented by “cutting with a pair of scissars the navel-string of the calf as soon as it is calved, about half an inch from the navel†.”

“Almost all the calves that I have seen, who are said to have died of the *cords*, appear, when they are opened up, ex-

* The following account of this distemper, and its cure, is given by Mr Sitwell, of Barmoor Castle in Northumberland, in the Farmer's Magazine, vol. vii, p. 285.

“The calf was then three days old, had left off sucking, breathed with difficulty, had a considerable discharge of saliva from the mouth and nose, and at the same time a great inflammation and hardness about the navel. I gave it one glass of port wine, one table spoonful of powdered bark, and 150 drops of laudanum. I then ordered the belly to be well fomented every two hours, with a hot infusion of chamomile flowers and marshmallows. The next morning I gave it two tea spoonfuls of rhubarb in a little milk, continuing the fomentation.”—

“On the third morning I repeated the dose of laudanum, wine, and bark, but discontinued the fomentation.” This calf then took its full quantity of milk and recovered.

† Farmer's Magazine, vol. vii, p. 503.

ceedingly red, and the small leaders or ligaments are considerably swelled, and have some kind of resemblance to *strings* passing through the internal parts, from which probably the disease has its name. Every symptom indicates a considerable degree of plethora, if not a very high degree of inflammation."—"If calves outlive five or six weeks, they are seldom in any danger*." This disorder is thought to be in part at least owing to the calf getting cold milk †.

"Calves, during the first three or four weeks, are sometimes seized with an inflammation in the intestines, provincially called the *liver-crook* or *strings*. It is attended with a strangury, and seldom cured, though bleeding gently in an early stage has been successful, and it may be prevented by cutting the navel-string of the calf, when newly dropped, till it bleeds. About the same time, they have been attacked with a swelling in the joints of their hind-legs, which may be cured by frequent fomentations and poultices of chamomile and other herbs, and by rubbing the parts with flannel immediately after the fomentations and on changing the poultice. There are likewise instances of their being carried off by water in the head, called here a *sturdy*; but none of these diseases are frequent, though the first mentioned is the most common ‡."

2. The *black-spald*, *quarter-ill*, and *black-leg*, are different names of one of the most deadly diseases of cattle. The first symptoms are lameness in one of the legs, generally one of the hind-legs. When the skin of the part affected is drawn up between the fingers and thumb, it makes a rattling noise, like a piece of dry skin rubbed between the hands. This disease commonly proves fatal in twenty-four hours, so that there is often no time for trying any remedy after it is discovered. Cattle of a year old are most liable to it, but it

* Farmer's Magazine, vol. iv, p. 59.

† Ibid. p. 296.

‡ Roxburghshire Report, p. 149.

sometimes seizes cattle of five years, and of both sexes, and generally such as are in the best condition.

The best method of cure seems to be, to take a little blood from the jugular vein, and then pour cold water on the part affected; rubbing and keeping the skin loose. If the skin still adheres to the flesh, it has been found of advantage, to make incisions, and rub in pepper, garlic, and salt. Instead of pouring water on the part affected, the animal has been compelled to swim in a deep pool, and afterwards kept in constant motion for some time. From half an ounce to an ounce of laudanum has been given with good effect. It has been recommended as a preventive, to take a little blood from young cattle in the end of harvest*.

3. The *moor-ill*, *wood-ill*, *red-water*, or *bloody urine*, is a less dangerous disorder than the former. It is ascribed to their eating some herbage growing among the heath, under-wood, or wood-pasture, to which they had not been previously accustomed, and probably also to a scarcity of good water for drinking. The head swells, the eyes are inflamed, the urine is of a red colour, as if tinged with blood, and the cattle affected become very costive.

A great variety of remedies have been prescribed for this disease, such as port-wine and bark, milk in which red-hot rusty iron has been put, the animal's own blood mixed with salt, &c. The most common remedy, and which is generally successful, is salt and water, and then copious draughts of clean cold water, till the urine resumes its natural colour†.

* See Farmer's Magazine, vol. v, p. 297, and xi. p. 524.

† The following cure has been recommended: "Take an ounce of bole armeniac, half an ounce of dragon's blood, two ounces of Castile soap, and one dram of roche alum, and dissolve them in a quart of hot ale or beer, and let it stand until it is blood warm. Give this as one dose, and if it should not have the desired effect, give the same quantity in about twelve hours after. I have practised this method of cure for forty years, with great success. Henderson's *Treatise on Swine*, p. 112.

4. The *rot, cling, or scour*, is a disease, which, when it has been completely formed, has been hitherto deemed incurable. In most instances, it arises from poor feeding in winter, especially after cattle had been in full habit. The first symptoms are a heaviness of the eyes, and a watery swelling below the jaw. It usually terminates in a violent and mortal flux. Dr Dickson prescribes a strong decoction of common chalk, hartshorn shavings, and cassia, in the proportion of half a pound of the chalk to four ounces of the shavings, and one ounce of cassia; boiling them in two English quarts of water to three pints: the last article being put in towards the close of the operation, adding to it, when cold, a pint of lime-water, and two drachms of the tincture of opium. The whole being well mixed, two or three hornfulls may be given twice or three times a-day *.

The other disorders of cattle need only be mentioned very shortly, as they are either less common, or not frequently fatal. The *tail-ill*, or *tail-worm*, as its name implies, affects the tail near the end, which feels as if the bone or cartilage had been dissolved. It may be cured, by slitting the part where the softness is felt, allowing it to bleed a little, and then binding up the wound with a salve of butter and salt, or salt, soot, and garlic. The *fell-ill* or *hide-bound*, can scarcely be classed among disorders. The skin adheres to the flesh and bones, as in every case when an animal does not thrive, and if there is no other disease, the only remedy is laxative and nourishing food. The *foot-rot* is a painful tumour between the hoofs, which may be brought to suppuration, by applying tar and hot-lime. The foot should be kept clean and dry, and any impurity of the blood removed by medicines administered internally. *Shooting* or *elf-shot*, is a disorder confined to milch cows, for which warm aromatic drinks, and medicines that promote perspiration, are the best remedies. The *darn* is a disorder common to stranger cattle,

* Dickson's Agriculture, vol. ii, p. 669.

brought to the Dee-side in Kincardineshire, and is always fatal. Sometimes the cattle affected become furious, and die apparently mad*. This distemper is said to have sometimes appeared among the cattle in Jed forest, where it is known by the name of *mad loup*. The remedy used there, is to kindle a fire of twigs of ash-trees, and to drive the animal frequently through the smoke, covering it afterwards with a blanket. The *crug-gles* affects young cattle with convulsive motions in their limbs, and the animal soon becoming unable to stand, dies seemingly of pure weakness†. A similar, or perhaps the same disease, is known in some parts of the coast of Morayshire, where it has the name of the "*croichlys*." The young cattle, from the second year, are liable to it, and it is most fatal to cows. "At first, one apprehends a dislocation in the hip-joint; while attending to that, the other leg is discovered to be in the same state, and in a short time, the lameness appears to be in all the legs." It is cured, by removing the patient to upland pasture, or keeping it in the house on mown grass, and giving a drink of warm water-gruel, with a handful of salt, and an ounce of flour of sulphur‡. The *scab* or *itch*, sometimes, though rarely, affects cattle. Mercurial ointment, or a solution of the corrosive sublimate of mercury is an effectual cure; but under these medicines, the animal must be kept warm, and have laxative food, along with purgatives. The same application will destroy *termin*, which sometimes infest cattle badly fed, or from other causes in an unthriving state. The *yellow*s is a disorder little known in Scotland; and *coughing* may be removed, it is said, by forcing the animal to swallow a new-laid hen's egg, and a pint of tar§. The *dry-murrain*, in which the animal is extremely costive, has been cured by laxative

* Kincardineshire Report, p. 384.

† *Ibid*

‡ Morayshire Report, p. 316.

§ Parkinson on Live-Stock, vol. i, p. 249.

medicines, and strong injections of common gruels, Epsom salts, tincture of senna, and olive oil *. “The *blister* that forms at the root of the tongue in full grown cattle is carefully taken away with a piece of cloth by the hand, removing the yellowish fluid it contains, which, if swallowed, is considered very dangerous †. A putrid distemper in the throat, called the *clyers* or *gargle*, is hardly ever cured. It is treated by bleeding, evacuations, and bark in milk, and some think this disease hereditary ‡.

Much loss is often sustained from causes which cannot well be enumerated among the distempers of cattle. The principal ones are abortion, and sore udders and teats, in cows; and hoving or bursting, and choking, in all sorts of cattle.

Abortion, or casting calf, proceeds generally from disagreeable smells,—often from hay that has been much heated, and is in a corrupted state, and from other unwholesome food. When one cow casts calf, there is much danger that all the others in the same cow-house will do so also, unless she is speedily removed, and her stall well cleaned out; and even with every precaution, it is scarcely possible to save them from the infection, unless they are but a short time gone with calf. The *udders* of milch cows, both when giving milk, and afterwards when put to fatten, sometimes become hard and swelled, and even suppurate. This disorder proceeds chiefly from careless milking, and lying on damp ground after having been long kept in a cow-house. Sometimes, though the cows are dry, when put on feeding pasture or turnips, the milk returns and produces much inconvenience. Before the udder has come to suppuration, bathing it with warm water, rubbing it gently, anointing it with camphor, and covering it with flannel, may be of advantage; but after suppuration, the matter must be discharged, and the wound kept

* Farmer's Magazine, vol. iii, p. 445.

† Dumfries-shire Report, p. 357.

‡ Ibid.

clean, and preserved from flies and other insects. Dr Dickson recommends to anoint the udder twice every day, with camphor and blue ointment, giving half a dram or more of calomel in warm beer, for three or four mornings, if the disease be violent. *Sore teats* may be prevented or cured by washing them with butter-milk, or salt and water, every time the cow is milked; and after being well dried, they may be anointed with hogs-lard, or sweet oil.

When cattle are fed on wet clover or other succulent herbage, they sometimes swell very much, and perish, unless speedily relieved. This is called *hoving*, or *heaving*, and is occasioned by the confinement of the gases generated in the stomach by the fermentation of the food. To give a free vent to these, the gut may be cleared of the hard excrements which impede the passage, by injections, or by forcing into the stomach tar, nitre, brandy, &c. The air may also be drawn off by means of a cane, leathern tube, or thick rope put down the animal's throat. The most common and speedy remedy is tapping, or making an incision between the hook-bones and the ribs, and inserting the barrel of a quill in the hole for a few days. The greatest danger of this disorder is, when cattle are first put on succulent food, particularly on red clover, in a dewy morning; and the best preventive is, to keep them from it till the dew has evaporated, and not to allow them afterwards to remain too long at a time. The same precaution should be used when they are fed on cut clover in the house, especially for a few days at first. Cattle feeding on turnips or potatoes, are sometimes in danger of being *choked* by pieces of them sticking in the throat. The leathern tube already mentioned, must be again applied here to remove the obstruction. The best preventive, when cattle are confined to the stake, is not to suffer them to raise their heads too high, and this can be easily guarded against by the manner in which they are chained.

PART II.

SHEEP *.

THE breeds of sheep in Scotland shall be treated of in the five following sections :

1. The Aborigines; 2. The Heath, Linton or Blackfaced; 3. The Cheviot; 4. The Leicester or Dishley; and, 5. The foreign breeds.

Each of these sections may contain, 1. A description of the variety to which it is appropriated; 2. An account of the system of management; and, 3. A statement of its produce in carcase and wool. A general view shall also be given of the summer and winter food allotted to each breed, and such

* The general name of the male sheep in Scotland, is *ram* or *tup*. While they suck, they are called *ram* or *tup lambs*, then *hogs* till they are shorn, afterwards *Diamond tups* or *rams*, and in the following years *two-shear*, *three-shear rams*, &c. When castrated, they are called *wether-lambs* while sucking, then *wether-hogs*, until they are shorn, when they get the name of *Diamonds* and *shearlings*, and afterwards *two-shear* or *young wethers*, *three-shear wethers*, &c.

The general name of the female is *ewe*. They are called *ewe* or *gimmer lambs* while sucking, then *ewe* or *gimmer hogs* till shorn, and after that *gimmers*; when shorn a second time *young ewes*, and afterwards *two*, *three*, and *four shear ewes*, according to the times they have been shorn.

The aged ewes which are sold yearly, are known by the names of *draft* and *cast ewes*, and in some places they are called *crocks*, *cranes*, and *slack ewes*.

The age of sheep, like that of cattle, may be known by the fore-teeth of the under jaw, of which they have also eight. When from fourteen to sixteen months old, they renew the first two, and two more every year about the same time, till they have been shorn a third time, when they are more than three years old, and have become full-mouthed. But this mode of judging of their age is not always to be relied on, as much depends upon their being early or late lambs, and on their feeding. An instance is mentioned by Mr Culley, in his *Treatise on Live-Stock*, of a shearling tup which had six broad teeth, and it is not uncommon for well-fed sheep, at that age, to have four teeth, instead of two.

other remarks as suggest themselves may conclude the section. A more particular description of the sheep and other live-stock of each county will be given in the Appendix.

To this Part of the Chapter shall be subjoined a sixth section on the Distempers of Sheep, and their most common remedies.

SECT. I.

THE ABORIGINAL BREED.

1. **T**HE small white or dunfaced sheep seem to have been the first of the species introduced into Scotland, and at the present time are to be found in great numbers in the Western and Northern Isles. Over all that part of Scotland which lies to the north of the Forth, they occupy a considerable portion of the higher pastures, especially where sheep farming upon an extensive scale has not yet been introduced. They are found perhaps in a purer state in the Hebrides, and in the Northern Isles of Orkney and Shetland, than on the mainland of Scotland, and it will therefore be necessary, in the first place, to describe these two varieties. At the same time, so little attention has been paid to this breed any where, and the stocks are so generally allowed to pasture indiscriminately among themselves, and with the breeds that have been imported into many of the larger islands, that there are considerable shades of difference, which promiscuous propagation is continually multiplying. It is generally understood, however, that all these varieties belong to the same original race, which was probably imported from Denmark or Norway at a very early period. In size, form, and quality of wool, they have a general resemblance to one an-

other, and in all these respects are very different from the other breeds of sheep in Scotland.

“ The Hebridean sheep is the smallest animal of its kind. It is of a thin lank shape, and has usually straight short horns. The face and legs are white, the tail very short, and the wool of various colours, sometimes of a bluish grey, brown, or deep russet, and sometimes all these colours meet in the fleece of one animal. Where the pasture and management are favourable, the wool is very fine, resembling in softness that of Shetland; but in other parts of the same islands, the wool is stunted and coarse, the animal sickly and puny, and frequently carries four or even six horns.”

“ The average weight of this poor breed, even when fat, is only 5 or $5\frac{1}{2}$ lbs. *per* quarter, or nearly about 20 lbs. *per* sheep. It is often much less, only amounting to 15 or 16 lbs.; and the price of the animal's carcass, skin and all, is from 10 s. to 14 s. We have seen fat wethers sold in the Long Island at 7 s. a-head, and ewes at 5 s. or 6 s. The quantity of wool which the fleece yields, is equally contemptible with the weight of the carcass. It rarely exceeds one pound weight, and is often short of even half that quantity. The quality of the wool is different on different parts of the body; and inattention to separating the fine from the coarse, renders the cloth made in the Hebrides very unequal and precarious in its texture. The average value of a fleece of this aboriginal Hebridean breed, is from 8 d. to 1 s. Sterling. From this account, it is plain that the breed in question has every chance of being speedily extirpated*.”

Notwithstanding the opinion of this writer, and of the late Dr Walker from whom he transcribes, there is reason to doubt whether this ancient breed is quite so contemptible. Both of them consider it the same with that of the Shetland Isles, of which a much more favourable account has been given by one “ who had the charge of flocks for many years, and be-

* Report of the Hebrides, p. 447.

stowed much pains and attention in correcting mistakes in the management of sheep flocks, as practised in the different parishes of Shetland." From his Report to the British Wool Society, the following account of the Shetland sheep is collected.

In these isles, it would appear, that there are two varieties of this breed, one of which is considered to be the *native*, and carries very fine wool *, worth from 2 s. to 2 s. 6 d. *per lb.* in 1792. By attentive management, the weight of the fleece was raised in six years from 1 to 2, and even to 3½ lbs. and at the same time improved in value. These sheep, however, are rather of a delicate nature; their number is much diminished, and in some places entirely extinct, in consequence of the introduction of foreign breeds. Their wool is short and open, and destitute of a covering of long hairs, found upon the coarse-woolled sheep, which serves to screen them from the rain, and to preserve them from the inclemency of the weather. "It may be entitled to some experiments," Sir John Sinclair observes, to "know whether crossing the Shetland breed with some thick fleeced, fine-woolled sheep, such as the South-Down, the Hereford, or the Spanish, might not be the means of producing a species of wool, of very superior value, and at the same time would not thicken the fleece, so as to make it a better protection for the animal."

The other variety carries coarse wool above, and soft fine wool below: "they have three different successions of wool yearly, two of which resemble long hair more than wool, and are termed by the common people *fors* and *scudda*. When the wool begins to loosen in the roots, which generally happens about the month of February, the hairs or *scudda* spring up; and when the wool is carefully pulled off, the tough hairs continue fast, until the new wool grows up about a quarter of an inch in length, then they gradually wear off;

* Culley on Live-Stock, p. 165.

and, when the new fleece has acquired about two months' growth, the rough hairs, termed *fors*, spring up, and keep root, until the proper season for pulling it arrives, when it is plucked off along with the wool, and separated from it at dressing the fleece, by an operation called *forsing*. The *scudda* remains upon the skin of the animal, as if it were a thick coat, a fence against the inclemency of the seasons, which provident nature has furnished, for supplying the want of the fleece." When the fine wool brings the price already stated, the coarse sells only at from 8 d. to 10 d. a pound.

The wool is of various colours. The silver grey is thought to be the finest; but the black, the white, the mourat or brown, is very little inferior; though the pure white is certainly the most valuable for all the finer purposes in which combing wool can be used *.

To this account of the Hebridean and Shetland sheep, it may be proper to add some description of this ancient breed, as it is found on the mainland of Scotland.

"There can be no doubt but the native breed, if properly attended to, would prove a much more valuable stock than the black-faced kind. If equal justice were done to them, they might probably be brought to an equal size; if not, the same ground would maintain so much the greater number." "Their wool sold at 16 s. a stone when the black-faced sold for 7 s. or 8 s." These sheep, by bad treatment, had become small and ill formed, but in general they still retained a fine pile of wool. "The breed was white-faced, some of them orange-faced, a few of them *polled*, but generally horned. Many of them were black and grey, which were more favourite colours than white, as they saved the trouble of dyeing the wool. The fleece, like the carcase, was small, but fine and close †."

* Vide Sir John Sinclair's observations on the different breeds of sheep, &c. Appendix, NO. 4.—Account of the Shetland sheep, by Thomas Johnston, p. 79.

† Argyleshire Report, p. 256.

In the northern part of Kincardine, we are told that there is still a remnant of the ancient aboriginal sheep of the country, which are to be found, more or less, all over the hilly parts of Britain, from the mountains in Wales to the most remote of the Shetland islands. This species is distinguished by the yellow colour of the face and legs, and by the dishevelled texture of the fleece, hanging much of it in detached ringlets, partly very coarse, and partly remarkably fine wool. The size seems to depend on the climate. None of them are large. But in Wales they are longer in the leg than on the Scottish Grampians. They do not differ much in actual weight, for in both situations they average from 7 lbs. to 9 lbs. a quarter. This, though a small breed, produces a remarkably delicate and highly flavoured mutton, and peculiarly esteemed by the greatest epicures*.

The *management* of this breed is everywhere so bad, that it is surprising the animals should have been able to live and propagate. Unless it be the very finest-woolled sheep of Shetland, they are hardy and wild to an extreme degree, and liable to very few diseases. There is no such thing as any regular system of management. On the mainland, there are very few belonging to one individual, "it being but rarely that a flock to the extent of half a hundred is to be seen†." "They were folded in summer and harvest, and housed in winter and spring. From the middle of May the lambs were deprived of half the milk, by separating them at night from their dams, which were milked in the morning‡." In Shetland the sheep "are gathered into folds about the beginning of April, that they may be the easier managed throughout the summer, and for *pulling off* the wool, marking the lambs," &c. "Sometimes they are lost, by running down steep banks, when pursued by the dogs, tumbling over precipices, and at other times falling into the sea. For six months in

* Kincardineshire Report, p. 385.

† Ibid.

‡ Argyleshire Report, p. 256.

the year, the attention bestowed on the flocks, by a great many proprietors in Shetland, is hardly worth mentioning. The sheep of one pasture generally herd together, although often the property of a hundred different individuals. They are known by marks cut upon their ears, every different proprietor having a different mark. I have seen in a flock of sixty ewes no less than twenty rams, the very worst in the flock both for size and colour, some of them carrying the coarsest wool, and sometimes of two or three different colours. The best lambs are cut, and the worst kept for breeders *."

By this treatment, these sheep, which might probably be rendered highly valuable, are more and more deteriorated every year. A few proprietors in Orkney, however, Mr Malcolm Laing in particular, have of late paid considerable attention to the improvement of their sheep, and it may be expected that their example will in time produce a happy effect on the general management. -

Two uncommon circumstances regarding the Shetland sheep deserve to be noticed. The first is their knowledge of the tides, when the sea-weed may be procured, which is often their chief dependence when the ground is covered with snow. "Immediately upon the tide beginning to fall, the sheep in one body run directly down to the sea-shores, although feeding on hills several miles distant from the sea, where they remain until the tide returns, when they return back to their usual haunts." The other circumstance is their being remarkably prolific, notwithstanding their severe privations and bad treatment. Two lambs at a birth are common. In one small island, "I have seen," says Mr Johnston, "27 ewes having 54 lambs, each of which sold for 7s. a-head."

The produce of this breed, managed in so barbarous a manner, must be inconsiderable both to the owner and occupier of the soil. The fineness of the wool, of all the varie-

* Report to the British Wool Society by Thomas Johnston, already quoted.

ties, particularly of some of the Shetland sheep, seems to prove, however, that neither the climate, nor the pasture of the Northern Isles, are unfavourable to the growth of fine wool. The immense improvement which may in time be effected in the fleeces of the sheep of the north of Scotland, by judicious crosses with a fine close-woolled race, and the vast advantages that would result from it to the proprietors and the public at large, cannot easily be calculated. It is perhaps not too rash to observe, that had the same attention been every where paid to the fleece of this native race, that has been given to the form of some other breeds, there would have been no occasion at this time, for importing Spanish and other wools, unless perhaps a little of the very finest quality. It is in such situations as the north of Scotland, and not on the finer pastures of the low country, where the quality of the fleece ought always to be a subordinate consideration to the weight of the carcase, that experiments should be made with a fine-woolled breed of sheep.

SECT. II.

THE BLACK-FACED MOUNTAIN BREED.

THESE sheep are commonly known in Scotland by the appellation of the *Tweeddale*, *Linton*, or *Blackfaced* breed, and, in contradistinction to the Cheviot, by the name of the *Short* sheep. They are also denominated the *heath* and *mountain* breed, from the general character of their pastures. Different varieties of them are to be found in all the western counties of England and Scotland, from Yorkshire, northwards. The best stocks occupy the counties of Peebles or Tweeddale, Dumbarton, Stirling, and part of Dumfries-shire.

“ It is uncertain from whence this blackfaced breed was originally derived ; but there is a tradition of its having been first planted upon the King’s farm in the forest of Ettrick. That farm used to contain a flock of 5000 sheep for the use of the King’s household, and probably gave rise to that mode of sheep-farming which still subsists in the south of Scotland *.”

1. The true black-faced sheep is thus described by the same writer : “ His body is of a plump barrel shape, his head is horned, and his face and slender legs are as black as jet, without any mixture of white. His face is set off with a thick prominent collar of wool surrounding the neck. He is the boldest, the most hardy and active of all the sheep kind. He fattens readily, and to a considerable size. When this is the case, and when he is of a proper age, with access to heather (heath), his meat by general consent is preferable “ to every other sort of mutton †,” that of the small native race perhaps excepted.

These sheep were first introduced into the West Highlands of Scotland, about the year 1762, and were soon found far more profitable than cattle for the higher parts of the country. It does not belong to this part of the work to give any account of the change which this stock produced upon the population of the Highlands, and our limits do not permit us to trace its progress from one county to another. One thing is indisputable ; a much greater value of mutton and wool, than of beef, was speedily obtained from the higher grounds, and all those situations where little or no provision could be made for cattle in winter. The best interests of the nation at large, as well as of proprietors, were therefore promoted by this change.

2. The *management* of this breed, where a correct system is adopted, is not materially different from that of the Cheviot breed to be afterwards described. It will therefore be

* Walker’s *Hebrides*, vol. ii. p. 72.

† *Ibid.* p. 71.

sufficient, in this place, to notice the outlines and points of difference, reserving a more particular account for the following section.

The period of gestation with sheep being twenty-one weeks, the general term of the admission of the rams to the ewes, is from the 15th to the 22d November, so that the lambing season may commence about the 11th or 18th April. The ewes are not allowed to have lambs till they are two years old, and in some situations, not till three. One ram serves from 40 to 50 ewes.

The lambs intended for wedders are castrated as late as can be hazarded, that they may show better in the forehead and in the horn*. After the lambs were weaned about the middle of July, (though in several places they are allowed to suck much longer), it was the common practice to milk the ewes for six, seven, or even ten weeks; but in some farms milking is totally discontinued, and in others the period is much shortened. The old ewes, sometimes called *crooks*, *croons*, and *slack* ewes, are drafted from the flock, and sold when from five to seven years old, commonly in autumn, but sometimes in the spring before dropping their lambs, when they are denominated *great* ewes. At both times they are purchased by farmers or graziers in the low country, who fatten the lambs first, and the dams afterwards, in the course of the following summer.

These sheep are shorn from the end of June to the middle of July, beginning with the rams, wedders, and hogs. They are not in general washed before being shorn, as is the case with the Cheviot and Leicester breeds. They are almost all smeared in November with a mixture of tar and butter; 12 Scotch pints, (about 21½ English quarts) of Norway tar, with 2 stones avoirdupois of butter, suffice for 50 lambs, or for 60 smeared for the second time. The same quantity of tar, with 38 lbs. of butter, smears 80 older sheep†. Different propor-

* Peebles-shire Report, p. 189.

† Ibid. p. 190.

tions of tar and butter are used in several counties, and in general too little butter is allowed.

When the flock is so numerous as to admit of it, the sheep are kept in different *hirsels*, according to their age, and the males are separated from the females. It is not often, however, that this classification is so complete as on the Cheviot hills. Many intelligent farmers "account nothing more necessary, than to keep the lambs, after weaning, upon the lower part of the pasture, from August till December; after which all go mixed over every part of the farm till March, when the heavy ewes are separated from the barren sheep, and feed with their lambs, upon the lower pasture, till the time that this pasture is again set apart for the new-weaned lambs. They judge that more depends in prevention of *sickness*, upon the grass being always in an eatable state, than upon mixing the young with the old sheep upon the hog-fence. Where a breeding farm sells wedder hogs, the heavy ewes are worst off in spring, the hogs getting the low grounds to fit them sooner for the market*." When the lambs are weaned, they are usually sent to the higher parts of the farm for about six weeks, and some better low lying pasture *hained* (saved) for their winter provision, which is called the *hog-fence*. Formerly this pasture was reserved exclusively for the lambs, which were admitted to it at Lammas; but from the observation made in farms so small, as not to admit of separate *hirsels*, that the hogs were much less subject to the *sickness*, (a disease often extremely fatal to hogs), it has of late come pretty much into practice, to allow the old sheep and the hogs to pasture indiscriminately together. Some farmers occasionally send their hogs to be wintered on low farms, where there is a great deal of heath and coarse pasture, and where the snow seldom lies long on the ground.

On small farms, a breeding stock is generally kept, and all the lambs are disposed off, except what are required to

* Peebles-shire Report, p. 196.

supply the place of the old ewes sold yearly. To keep up a stock which sells 200 full grown sheep, at least 300 lambs must be reared every year, to cover losses by disease and casualties *. On large farms the stock is mixed, or consists of a portion of wethers, amounting to near one-third of the whole number. The wethers are usually sold, when from two and a half to three years and a half old, and sometimes in condition for the butcher, though they are more frequently fattened on turnips, or on the pastures of the low country.

The food of these sheep, summer and winter, is the same. They very rarely get hay, or any other food than what their pastures afford. It is surprising how hardy they are, and how little injured, even when the snow lies several weeks. They dig and scrape for the withered herbage, and face the driving storm with much resolution, when all other domesticated animals seek shelter from the care of man.

3. The produce of these sheep in mutton and wool is different, according to the quality of their pastures. Their flesh is well known to be excellent, and their fleece very coarse, and of little value. The average weight of a fat wether is stated at about 52 lb. the four quarters, and of a ewe at 40 lb. †. In Tweeddale or Peebles-shire, which may be considered the head-quarters of this breed in Scotland, the prices in 1813 were for fat lambs 10 s. to 14 s. Ewes in lamb in spring, from 23 s. to 24 s.—when fattened on turnips the following winter, 24 s. to 26 s. Wethers three years old, for feeding 27 s. to 29 s.; when fed on turnips, from 32 s. to 35 s. Their wool sold in 1811 and 1812 at 10 s. *per* stone, of 24 lb. *avoirdupois*, and in 1813 at 12 s.; but afterwards, in the course of the summer, was worth 17 s. From six to seven fleeces make a stone of 24 lb. ‡. These prices, however, are above the average of stocks and of seasons. “ By

* Dumbartonshire Report, p. 227.

† Ibid. p. 228.

‡ Farmer's Magazine, vol. xiv, p. 455.

comparing a variety of communications, it appears that the medium price of white (unsmeared) wool, for a number of years past, may be about 8 s. 8 d. *per stone*,* of 16 lb. of 23 ounces, or 4½ d *per pound* avoirdupois; that of smeared wool is reckoned 25 *per cent.* lower *. The sheep of all ages, on an average of different stocks, are also fully 10 *per cent.* below the prices quoted; in some of the higher parts of Galloway, at least 20 *per cent.*

Of the number kept on any given extent of land, some notice will be found in the Appendix, when the live-stock of each county shall be mentioned separately. There are no experiments recorded in the county reports for the purpose of ascertaining the live weight, or the quantity of meat gained by any given consumpt of food. But some remarks on that head shall be offered in a subsequent section.

SECT. III.

THE CHEVIOT BREED.

THIS variety occupies the hilly districts around Cheviot, (from which it takes its name), on both sides of the boundary between England and Scotland, where it is found in its purest state. It has also spread over the greater part of the county of Dumfries, and shares with the mountain breed the hilly pastures of several other districts. A few large farms in the northern counties of Ross, Sutherland and Caithness, have been lately stocked with Cheviot sheep, by farmers from Northumberland and Roxburgh.

The pastures of the Cheviot hills contain a large proportion of *green sward*, which towards their base is often very fine. The hills are mostly of a conical form, which affords

* Dumbartonshire Report, p. 288.

shelter from almost every quarter. There is very little wood or artificial shelter of any kind, and no arable land in the higher parts of the district. Many farms do not produce hay sufficient for a week's consumption; some of them none at all. The snow sometimes lies very deep for several weeks, during which the flocks must be removed to the lower grounds, or hay brought for them from a considerable distance on horses' backs, for carts cannot be used over a great part of this district.

As the fitness of these sheep for mountainous pastures has been the subject of much dispute, it is of importance to keep in view the actual state of the Cheviot district, especially as a different account has been given by a late writer. Dr Walker, in his *Economical History of the Hebrides and Highlands of Scotland*, observes, that "Cheviot, from which they are named, comprehends a group of mountains between one thousand and two thousand five hundred feet in height, of course equal to many in the Highlands, and with similar pasture. But to imagine that what are called Cheviot sheep, are the sheep bred upon these mountains, and consequently fit to be bred upon such mountains in the Highlands, is a great deception. What are commonly termed Cheviot sheep, are not bred upon the mountains of Cheviot, but upon the *low and fertile lands* in their neighbourhood, where they have such winter sustenance upon turnips and hay, as the Highlands do not yet afford. In such a situation, and with such sustenance, no sheep give a greater return; but, unless they are managed, and indeed *pampered* in this way, they cannot be profitable. They would perish with poverty and disease, where the black-faced or brocket sheep would prosper. In the valleys of the Highlands, where there is a good summer pasture, and where turnips and hay can be afforded in winter, the Cheviot sheep is the stock to be chosen; but where there is no such winter provision, it will be found very hazardous to adopt them, as they are of a size too large, and of a nature too delicate, to

live all the year on a highland pasture *." This statement is repeated in substance, in the more recent Report of the Hebrides, by Mr Macdonald.

The fact certainly is, that the Cheviot sheep are not bred on low and fertile lands, nor pampered with hay and turnips—the greater number indeed, scarcely ever taste either hay or turnips until they are sent to the low country to be fattened. At the same time, it must be admitted, that the herbage and natural shelter of those hills are favourable circumstances, which are not to be found in a continuous range of black heathy mountains, where no provision can be made for winter. Perhaps it may be said, in the words of the intelligent reporters for Northumberland, "that each breed," (the blackfaced, and the Cheviot), is particularly adapted to particular situations, the one to *coarse, exposed mountains*, where the luxury of green herbage is thinly scattered, or rarely to be found; the other to *hilly pastures*, where considerable portions of verdant surface predominate, such as characterize the pastoral districts around Cheviot †."

"The present system of sheep, or store farming as it is called in the south of Scotland, does not appear to have taken place till about the end of the reign of James VI. Before that period, the mountainous south country districts were kept under a stock of black cattle, and some small straggling flocks of sheep, as was the case in the Highlands till of late years ‡." At the present time, there are few cattle kept on the Cheviot hills, and, with the exception of a very small number of cows and horses, for the use of the farmers and their herds, and a few patches of arable land on some farms, the whole district is occupied by sheep. But in what manner this change was effected, and by what means

* Walker's Hebrides, vol. ii, p. 72

† Northumberland Report, by Messrs Bailey and Culley, p. 159.

‡ Walker's Hebrides, vol. ii, p. 100.

the present breed has been formed, seem to be altogether unknown. The first improvement that has been noticed, is said to have been made about 1760, when the native breed, (perhaps at an earlier period, somewhat similar to the ancient race found in the Highlands), was crossed with tups brought from Lincolnshire*, and there have been later instances of improvement, by using tups that had a dash of the Dishley or Leicester blood. The Cheviot breeders of the present day, have had recourse to no other means of improving this breed, than careful selection among their own and the neighbouring stocks; and many of them have brought their flocks to a degree of perfection, which renders them not less adapted for their situation, than the Leicesters are for arable districts.

The Cheviot sheep are without horns; the head—bare and clean, with jaws of a good length: their face and legs are white; the countenance—open, and eyes—lively and prominent. The body is long, but the fore-quarters generally want depth in the breast, and breadth both there and on the chine, though, in these respects, great improvements have been made by the more skilful managers. The legs—small boned, and well covered with wool to the knee-joint or houghs. The fleece—white, soft, close and thick-set, and of a medium length of pile; pelts—thin; and long bushy tails.

These are the general characters of the pure Cheviot breed, but many of them have grey or dun spots on their faces and legs, especially on the borders of the district, where they have come in contact with their blackfaced neighbours. On the lower hills at the extremity of the Cheviot range, they have been frequently crossed with the Leicesters, and several stocks, originally Cheviot, have now a good deal of the form and fleece of the Leicesters. Of both of these crosses some account may be given at the end of this section.

To give some idea of the management of this breed, it will be necessary to attend to the different sizes of farms, and

* Roxburghshire Report, p. 152.

qualities of pasture, which in a great measure determine the store-farmer to occupy his land with, 1. A breeding stock ; or, 2. A breeding and rearing stock ; or, 3. A breeding and fattening stock.

1. *A Breeding Stock.*

1. By this expression, is meant a stock of ewes, the lambs of which are all sold, except such a proportion of the ewe-lambs as are required to be reared, for supplying the place of the old ewes drafted and sold annually. A greater or less proportion of lambs must be reared, according to the age at which the ewes are sold. If they are sold after nursing their third lamb, which is the common practice, a number of ewe-lambs, equal to a third part of the ewes, and to the usual casualties, must be selected and reared annually for keeping up the stock.

2. Farms which are adapted to a stock of this kind, are commonly of a moderate, or rather a small size, and of a quality of pasture nearly uniform, or but little diversified. As a great part of the profits of the occupier depends on the sale of lambs, it is of much importance to bring them to market in high condition, and for this purpose, to be able to give turnips to the ewes for a few weeks in spring, that they may have abundance of milk. Many of these farms are on the skirts of the Cheviot hills, and contain a small portion of arable land for turnips ; and when turnips cannot be raised at home, the ewes are often sent to turnips on lower grounds, and brought home before the lambing season. This is particularly necessary and advantageous with gimmers, who are in lamb for the first time, and do not milk so well as the older ewes.

The principal points that deserve attention in the management of a breeding stock, shall be mentioned in the order of time, beginning with the period from November to May, and then proceeding with the other six months from May to November.

3. About the beginning of November, the tups are put to the ewes, a little earlier or later, according to the prospect of spring food, but seldom before the 8th or 10th of November. The number of tups required, is more or less, according to the extent of the pasture, and their own age and condition. If the ewes are not spread over an extensive tract, one tup to sixty ewes is generally sufficient. It is usually thought advisable to separate the gimmers from the older ewes, and to send the tups to the latter eight or ten days before they are admitted to the former. Notwithstanding this precaution, which retards their lambing season till the spring is farther advanced, ewes which bring their first lamb when two years old, the common period on farms suited to a stock of this description, are often very bad nurses, and in a late spring lose a great many of their lambs, unless they are put into good condition with turnip before lambing, and get early grass afterwards. This separation, and difference in the time of admitting the tups to the ewes and gimmers, should therefore be always attended to.

4. When a farm under this description of stock, has the convenience of a few good inclosures, still more minute attention is paid by skilful managers. It is not sufficient that the tups are carefully selected from perhaps double the number, the ewes also are drawn out and assorted, and such a tup appropriated to each lot, as possesses the properties in form or fleece in which the ewes are deficient. In other cases, the best tup and the best lot of ewes are put together. When neither of these arrangements can be adopted, owing to the want of inclosures, it is the practice to send the best tups to the ewes for a few days at first, and those of an inferior description afterwards. In every case, when the farmer employs tups of his own flock, he is careful to have a few of his best ewes covered by a well-formed and fine-woolled tup for the purpose of obtaining a number of good tup lambs, for preserving or improving the character of his stock.

5. The stock through winter, consists of ewes and gimmers.

which should have lambs in spring. Ewe lambs or hogs, and a few young and old tups. All these are sometimes allowed to pasture promiscuously, but on the farms around Cheviot, the ewes and ewe-hogs are kept separate, and on such lands as are adapted to the kind of stock under consideration, the ewe-hogs are either put on rough pastures, which have been lightly stocked in the latter end of summer, or get a few turnips once a-day, in addition to the remains of their summer pasture. The most effectual preventive of the desolating distempers to which sheep of this age are liable, is turnips; and though they should never taste them afterwards, a small quantity is frequently given them during their first winter. After the tups have been separated from the ewes, they are usually indulged with the same feeding as the hogs.

6. The ewes, during winter, are seldom allowed any other food than what their summer pasture affords, except that a small part of it may sometimes be but lightly eaten, and reserved as a resource against severe storms. When these occur, however, as they often do in the Cheviot district, there is little dependence on any other food than hay. When the snow is so deep as completely to cover the herbage, about two stones avoirdupois of hay are allowed to a score of sheep daily, and it is laid down morning and evening in small parcels on any sheltered spot near the house, or under the shelter of *stells* or clumps of trees, on different parts of the farm. Very great losses have been often sustained among the Cheviot hills in snow storms. In a single night many sheep have been buried alive under a drifted heap of snow, several feet deep; and there have been several instances of the shepherds perishing in their attempt to lead them to a place of security. The management of the sheep at such times, must be regulated by local circumstances, and a great deal depends on the skill and assiduity of the shepherd. Every store farmer is aware of the importance of shelter, particularly by means of plantations; but there are many farms on the Cheviot hills, where no artificial shelter

can be secured, in a situation convenient for the flock. Trees will scarcely grow in the places where they would be most useful, and the spots where trees might be reared, are often at such a distance from the range of the pasture, that a large flock would be more injured than benefited, by being collected and driven into a small space. Besides this, it is a matter of considerable difficulty to preserve young trees from either the Cheviot or the blackfaced sheep. A stone-wall of five feet in height affords them but a very precarious security. On the lower hills around Cheviot, belts and stells are numerous; but in the higher situations, or *fells*, as they are usually termed, natural shelter is almost the only dependence in severe weather.

7. In March, the ewes, at least the gimmers or young ewes, are commonly allowed a few turnips once a-day, which are either carted to their pastures, or eaten on the ground, by bringing the sheep to the turnip field through the night. A part of it in the latter case is cut off by nets or by hurdles, which inclose the sheep, in the same way as if they were intended for fattening, which shall be afterwards noticed.—When they are ready to drop their lambs, they are no longer kept on the turnip field, and get what turnips may be left, on their pastures. But it is seldom that the turnips last so long, though it is desirable to have a few remaining to be given to the weakest ewes, or to such as have twins, in a separate inclosure.

8. A few days before the time of lambing, the ewes are collected for the purpose of being *udder-locked*. The sheep are raised upon their buttocks, their back next to the operator, who then bends forward and plucks off the *locks* of wool growing on or near the udders, for the purpose of giving free access to the expected lambs. At the same time he ascertains the condition of the ewes, and marks such as do not appear to be in lamb, which may then be separated from the others. This operation is not without danger, and several premature births are usually the consequence. It is therefore not so

general a practice as formerly, though still a common one on many, if not most farms. It is very rarely that a lamb cannot get at the teat without *udder-locking*, and there is probably more loss than advantage in the measure. What renders it very doubtful if the practice is founded in expediency is, that even the hogs who have no lambs undergo the same operation.

9. On those farms, where the hogs have been allowed to pasture through winter promiscuously with the ewes, which is seldom permitted on the Cheviot hills, a separation should always take place at the commencement of the lambing season, and the lowest and finest part of the pasture ought to be exclusively appropriated to the nursing ewes.

10. The ewes begin to drop their lambs in the first or second week of April, according to the time at which the rams were admitted; and such as have twins generally lamb among the first of the flock. At this season, the most constant attention is indispensable on the part of the shepherds, both to the ewes in labour and to the newly dropped lambs. Though the Cheviot ewes are not so liable to losses in parturition, as some larger breeds which are in higher condition, and though they make good nurses, unless they are very lean and their food scanty, yet, among a large flock, there are always a number that need assistance in lambing, and in a late spring not a few who have not milk sufficient for their lambs, particularly among the gimmers or young ewes. Besides, the lambs are not so well covered as the blackfaced, and if dropped in severe weather, sometimes in snow, several of them are never able to rise to the teat, and speedily perish, or are forsaken by their dams. A careful shepherd at this time always carries a bottle of milk along with him, which he drops from his own mouth into that of the lamb that may need it,—brings the ewes that have little milk to a better pasture, or to turnips,—and confines such as have forsaken their lambs in a small pen or *barrack*, as it is called, temporarily erected in some part of the farm-steading. The same confinement is necessary

when it is wished to make a ewe that has lost her own lamb nurse that of another ewe that has had twins, or that has perished in lambing, or is from any cause incapable of rearing her lamb. The ewe, after being shut up for a few hours with the stranger lamb, usually admits it to the teat, and ever after treats it as her own; though sometimes a little deception is necessary, such as covering the stranger with the skin of her own lamb.

11. At this important season, an inclosure of rich early grass, near the shepherd's cottage, is of vast advantage. Thither he carries the ewes and twins,—such as have little milk,—those that have been induced to adopt another's offspring,—and generally, all that need to be frequently inspected, and are in want of better treatment than the rest of the flock. It will give a sufficiently distinct idea of the dangers which attend the lambing season on the Cheviot hills to mention, that in the spring of 1799, a third part of the lambs on many farms perished; and in every late spring, there is a considerable loss even upon the best farms;—so far is it from being true, that the Cheviot sheep are bred on low fertile lands only, and highly fed with turnips and hay.

12. As soon as the weather is favourable, after a considerable number of the ewes have lambed, they are collected into a fold, and all the male lambs are castrated, except a few of the best, reserved for rams. The ewe lambs are never spayed.—An assistant holds up the lamb with its back towards his breast, and the operator, commonly the principal shepherd, cuts off a part of the scrotum, and gently starting the testicles, seizes them with his teeth, and draws them out, with the ligaments attached to them. The tails of ewe and wether lambs are usually shortened at the same time, and a small tar mark is put on the latter, particularly on such as have but one testicle in the scrotum, which are called *ryglands*, and afterwards *chacers* and *teazers*, and should be always carefully distinguished. It is advisable to perform the severe but necessary operation of gelding, when the lambs

are but a few days old, if the weather will permit, instead of delaying till the end of the lambing season, as is still the case in some instances. The lambs are lifted over the fold to their pasture, as soon as the operation is finished, and carefully prevented from lying long at a time, by a person who goes among them and rouses them to exertion. If they bleed freely, and the weather continue mild and dry, there is seldom any considerable loss sustained, nor do they require any topical applications.

13. Towards the end of the lambing season, the ewes that have not yet dropped lambs, are separated from the flock, and kept by themselves, that they may be more under the eye of the shepherd, than if scattered over all the pasture. It is desirable to allow them finer grass for a few weeks after lambing, that their lambs may come to be nearly equal to the rest of the flock when weaned; or, if they are too late for this, that they may get ready for the butcher by the month of August, beyond which period the ewes must be much injured by suckling them.

These are the principal circumstances to be attended to, in the management of a ewe stock, from the beginning of November till about the middle of May. In several situations, there are other arrangements which a judicious store-farmer introduces into his management. If he has the convenience of inclosures, and a variety of pasture, he draws out, in the month of October, the ewes to be disposed of in the following season, puts the rams to them two or three weeks earlier than to the rest of his flock, gets the lambs ready for the butcher in June, and makes their dams very good mutton by the end of the grass season. There are not many farms, however, where a breeding stock of Cheviot sheep is kept, which admits of this practice. On farms of this description, the more common stock is, either a cross-breed between Leicester rams and Cheviot ewes, or draft ewes of the Cheviot breed, which are bought every autumn, and after having fattened their lambs, are all sold off in the course of the next

season. Both of these modes of management will be afterwards noticed.

14. When the wool has risen sufficiently from the pelt, (and the proper time is easily known by the appearance of a new growth), the ewe hogs and barren sheep are brought to the washing pool. If they have been kept in good condition through the preceding winter, they are ready for being shorn towards the end of June, and they are washed as a necessary preparation. Sometimes they are hand-washed by men who stand in the pool, and have the sheep forced towards them singly; but more commonly, the Cheviot sheep, especially if the flock be numerous, are compelled to leap into the pool in a body for three or four times successively, and it is desirable that they should have room to swim a little, and come out on a green low bank on the opposite side. The ewes are washed in the same manner, a few days after. It was formerly the general practice, and still continues to be so in many situations, to delay washing the ewes till the lambs were ready for being weaned or sent from the farm; but upon lower farms, where the pastures are good, and the ewes in decent condition, it is common to shear them sooner, as a load of wool in warm weather, is very injurious to their thriving, fosters vermin, and sometimes disables them from rising when they have lain down on their back, in which state they soon perish. The principal objection to earlier washing, is, that a few of the lambs sometimes do not afterwards recognise their dams, especially after they are shorn.

15. After being washed, the sheep are preserved as far as possible from rubbing against earthen dikes or banks, and from lying down on any dirty spot which might soil their wool. If there is no access to such places, it is considered an advantage to delay shearing them for eight or ten days; but they are more commonly shorn as soon as they are sufficiently dry, which, if there has been no rain in the interval, may be in forty-eight hours or less. There are two methods

of shearing ; in the one the operator sits on the floor or on the ground, lays the sheep on its back between his knees, begins with the belly, and afterwards, having tied the animal's legs, proceeds very expeditiously, at the rate of four or five sheep in the hour, or from forty to fifty a day. This is the common method of shearing Cheviot sheep, and the other will be afterwards described. Every careful shearer, or *clipper* as he is termed in Scotland, is cautious to avoid wounding the animal, particularly by stabbing with the points of his shears, which is often dangerous. When he clips a little of the pelt, tar is applied to keep off the flies, and the wound soon heals over. The fleeces are neatly lapped up, after any filthy spots have been clipt off, the shorn side outwards, beginning at the breech-wool, and using that of the neck and shoulders as a bandage. Before the shorn sheep are turned out to pasture, they are marked, commonly with the owner's initials, by a stamp, or *boost* in provincial language, dipped in tar heated to a thin fluid state, and it is usual to place this mark on different parts of the body, according to the sheep's age. Either then, or at smearing, it is also not uncommon to give them a mark on the ear, for the purpose of distinguishing different flocks, and the several ages of the same flock.

16. The principal markets for Cheviot lambs in the south of Scotland, are held in the month of July, the first on the fifth of July, so that the lambs may commonly be weaned when about three months old, and sometimes sooner. When the ewes are gathered to be washed or shorn, the ewe lambs to be kept for supplying the place of the old ewes annually sold, are stamped in the same way as the ewes, and sometimes also marked with a hot iron on the face. All the wether lambs, and the worst of the ewe lambs, go to market either in two or in three lots. The first lot consists of what are called the top wether lambs, the second is drafted from those that remain, and the third contains the smallest and worst shaped of both sexes. A well managed small flock seldom requires so many distinctions ; the best wether lambs

are put into one class, and the smallest of the ewe and wether lambs into another.

17. The store lambs are sent to some clean grassy pasture for a few weeks; and where the farm does not afford this accommodation, they must be *summered*, as it is called, at a distance. Several farms near Cheviot, and on the Lammermuir hills in Berwickshire, are appropriated to this purpose, the owner of the lambs paying so much a head for six or eight weeks. In the mean time, the ewe hogs, or gimmers as they are denominated after shearing, have joined the ewe stock, and the lambs, when brought home, go to the pasture which they had occupied. On the farms to which these remarks are applicable, there cannot be said to be any *hog-fence* allotted to lambs the first winter. It is often necessary to send them from home after being smeared, or they sometimes do not return at all till spring, but are both *summered* and *wintered* on the same or different farms. Wherever they may be kept in winter, it is always desirable to allow them a few turnips along with a full bite of coarse herbage. Very great losses are often sustained on these summering and wintering grounds, particularly on the latter, which might be much diminished, if arrangements could be made for keeping them always at home under the eye of the owner.

18. When the lambs had been separated from the ewes, it was formerly the practice to milk the ewes for six or eight weeks or more, and this most objectionable practice is still continued by several farmers. The most skilful store-masters, however, have either laid aside milking, unless for a few days, or have shortened the period to two or three weeks. The value of the milk for eight weeks, will not exceed from 1s. to 1s. 6d. a head, and the sheep are injured to at least three times that amount, independent of accidents at the milking fold. The cream is separated from the ewe milk, and made into butter for smearing, and the milk itself mixed with cow-milk, and converted into cheese. Of these processes, it is unnecessary to give any account, after what has

been already said of butter and cheese making in the proper place.

19. The next object of attention, is the drafting of the old ewes, to be sold in September or October. Their age, on the lower hills, is usually four years and a half, or they are disposed of after having reared three years lambs. In some situations they are kept on till a year older; but when they are purchased, as they usually are, to be kept another year on lower grounds, it is commonly for the interest of the store-farmer, to sell them when still in their full vigour. Skilful managers do not content themselves with drafting them merely according to age; and as there is no disadvantage in keeping a few of the best another year, they take this opportunity of getting rid of such of the flock of other ages, as are not of good shapes, or are otherwise objectionable. As soon as the ewes to be disposed of are drawn from the flock, they are kept by themselves on better pasture, if the circumstances of the farm will admit of it. Sometimes they are carried on till they are fattened, and turnips are often purchased for them at a distance. When this is the case, it is not thought advisable to keep them longer, than till between Christmas and Candlemas, as an old ewe does not improve like a wether in the spring months.

20. The last operation of the season is salving or smearing, which is usually performed towards the end of October or beginning of November, before the rams are sent to the ewes. The most common materials are butter and tar, mixed in different proportions,—a greater proportion of tar being employed for the hogs or young sheep than for the older ones. The proportions are also different on almost every farm, and more tar is thought to be necessary, according to their elevation and exposure. In Roxburghshire, some mix two gallons of tar with 36 lbs. of butter, as a sufficient allowance for threescore of sheep; but for the same number, it is more common to allot only one stone (24 lbs.) of butter, to two

gallons of tar * : A common proportion of late has been about 14 lbs. of butter, to two Scotch pints of tar, (nearly $3\frac{1}{2}$ quarts English wine measure) for ewes, and 11 lbs. to the same quantity of tar for hogs. This mixture should smear from twenty to twenty-five of each, which is the number one man can do in a day. The expence, according to present prices, will be about 9 d. for each sheep. Other articles, such as oil, palm-grease, tallow, &c. have been recommended in place of butter; but none of them are in general use, and the only addition that is approved of is a little butter-milk. The butter is slowly melted and poured upon the tar, and they are constantly stirred till they become cool enough for use. The wool is accurately parted into rows from the head to the tail of the animal, and the salve is carefully spread upon the skin with the point of the finger at the bottom of each row. The object of this operation is to destroy vermin, —to prevent cutaneous diseases,—and to promote the warmth and comfort of the animal during the storms of the ensuing winter. It is not necessary with sheep kept on low grounds, and well fed during winter, and it may be occasionally omitted for one season, particularly with old sheep, without material injury; but notwithstanding the ridicule that speculative writers have attempted to throw upon the practice, it is almost universally considered necessary and beneficial on high exposed situations, by the store-farmers of Scotland. Smeared wool does not sell so high as white wool, but the greater weight of the former more than compensates for the difference in price †.

The annual sales from a breeding stock, consist of the

* Roxburghshire Report, p. 155.

† Folding is seldom practised in Scotland, and it is disapproved of by all the best sheep-farmers. In a few instances, a part of a flock may be confined for some weeks in temporary folds, for the purpose of manuring old tough patches of land intended to be ploughed for oats next season; but even this practice is falling into disuse. Sheep are never folded on fallows in Scotland.

wool of ewes,—ewe hogs, and rams,—of a third part of the ewes,—of all the wether lambs and the smallest of the ewe lambs, and of a few tups. The prices of all these are various according to the character of different stocks, and the state of markets in different years. Last summer Cheviot wool sold at from 27 s. to 30 s. *per* stone of 24 lb. avoirdupois, having declined in price at the same time that both long and coarse wool advanced considerably. It has of late years varied from 30 s. to 40 s. About ten fleeces of white wool, and $7\frac{1}{2}$ or $7\frac{3}{4}$ fleeces of salved wool are required for such stone *. Lambs last season brought from 10 s. to 14 s.; and draft ewes, which may weigh when fat from 12 to 15 lbs. a quarter, were sold at from 21 s. to 25 s., and some of the best stocks as high as 30 s. a-head.

2. *A Breeding and Rearing Stock.*

The difference between this and the former stock consists in this, that all, or nearly all the lambs, ewe and wether, are kept on till they are of an age to be fattened. The principal store-farmers of the Cheviot hills adopt this system, for which a great extent of land, and a variety of pasture, are indispensable. It is seldom that it can be fully carried on upon any one farm, however large, and it is therefore common for one man to rent several farms, often at a distance from one another, each of which he occupies with the description of sheep for which its pastures and situation seem best adapted.

The general management is not materially different from what has been already described under the former article, except that as this system is adopted on higher, and more exposed tracts of country, the lambs are not permitted to come so early, and as a part of the pastures is of an inferior quality, it is the common practice not to begin to breed from the

* Roxburghshire Report, p. 154.

ewes till they are three years old, instead of two. To supply the place of the old ewes sold yearly, there must therefore be two ages of females, one of them shearlings or gimmers, and the other two shear or young ewes. The wethers were formerly sold at $3\frac{1}{2}$ years old, but of late frequently a year sooner. In the latter case, a flock of 2500 sheep at smearing time, after allowing a deduction from the numbers of the young stock, for inferior lambs or hogs drafted and sold, and for casualties, may consist of the following proportions :

Ewes to bring lambs in the ensuing spring,	-	-	1000
Ewe hogs,	-	-	400
Gimmers, (once shorn),	-	-	350
			—— 750
Wether hogs,	-	-	400
Dinmonts, (once shorn),	-	-	350
			—— 750
			——
			2500

The proportion of different ages is, however, entirely dependent on the circumstances of every farm, which prescribe the most profitable arrangement. On some of the lower farms, for instance, the ewes bring their first lamb at two years old; and on a few of the higher situations, it may be advisable to keep the wethers till $3\frac{1}{2}$ years old. If the pastures are so much diversified, as to require that both these arrangements should be combined, a stock of 2500 sheep at smearing time would consist of different proportions from those stated above; a lot of wethers twice shorn would have to be added to the one side, and the gimmers withdrawn from the other. By the above arrangement, the ewes are supposed to be sold when they have brought lambs for three years, or at the age of five and a half, and their place is supplied by the gimmers, which are then a year older.

Each of these five descriptions of stock, is kept in a separate *hirscl*, if the number is not too small for employing a shepherd; and in the course of the following summer, a sixth

hirsel is composed of lambs; and if the wethers are kept till three and a half years old, they may form a seventh. To appropriate to each kind of stock, the pastures which are best suited to its age and sex, requires a great deal of skill and judgment, which can only be derived from experience; and upon this, more perhaps than any other circumstance, does the success of the store-farmer depend. "Grounds, where young sheep are liable to diseases, are naturally stocked with those that are aged, while the weaned lambs or hogs, are sent to more healthy pastures *;" and better pastures are invariably allotted to the breeding ewes, and to the wethers before they are sent to market, than to the young stock.

The expediency of such large occupations as this system of management requires, like almost every other question in rural economy, has been the subject of much dispute. It is not many years since depopulation was urged as a ground of complaint even in the south of Scotland, though if the inhabitants of the Cheviot hills had been at once dislodged, they would not only have found full employment in the space of a few miles, but their numbers would scarcely have been felt as an addition to the population of two or three of the nearest counties. In this case a mere change of residence, though it may be distressing to individuals for a time, is of no importance whatever in a national point of view; and indeed to maintain a greater number of inhabitants on these hills, than is required for the management of the flocks, while the demand for productive labour in the low country, can with difficulty be supplied, would be at once injurious to the public interest, and to that of the proprietors and occupiers. To render the soil as productive as possible, it is even necessary that the number of separate farms should not be too much multiplied on these hills. There are several large tracts upon which a breeding stock cannot be kept, which are nevertheless well adapted to young sheep; and as the latter can sel-

* Roxburghshire Report, p. 154.

dom be reared on the same ground on which the breeding ewes are kept, it is certainly a preferable mode, to unite different farms under the management of one experienced store-master, than to divide them among a number of independent occupiers, commonly without either skill or capital. These extensive occupations have certainly enabled the farmers of the Cheviot hills, to improve their flocks much beyond what would have been possible, had the farms been so small, as to limit their experience to one of the several descriptions of stock; and it is in a great measure owing to the comparatively small size of farms in the contiguous districts, that the Cheviot sheep are not to be found there in equal perfection.

To ensure the constant attention of shepherds to their respective charges, the principal part of their wages is paid by sheep, which they are allowed to pasture along with their master's. The number of each *hirsell* is ascertained at different times, particularly at the two great *gatherings* for smearing and shearing, and the shepherd must account for them either alive or dead; in the latter case, he must produce their skins, and if the mortality has been beyond the common ratio, it is expected that he should be able to give satisfactory reasons for his losses.

The annual sales from a flock of this kind are, first, The wool of the whole flock, of which the price has been already stated; second, A certain proportion of the ewes; third, The wethers two years and a half old, or a year older; and fourth, Incidental sales of small lambs or hogs, and of tups. Wethers of improved flocks, a little fed at $3\frac{1}{4}$ years old, are at an average about 15 lbs. *per* quarter, and rise to 18 lbs. and upwards when fed on turnips*, and their price to the breeder, according to the demand in different years, may run from 25 s. to 35 s. a-head.

* Roxburghshire Report, p. 155.

3. *A Breeding and Fattening Stock.*

There are no farms on the Cheviot hills, adapted to that management, which requires that all the lambs should be not only reared, but the whole stock fattened; but there are several instances of farms that prepare all the wethers for turnips, which are purchased by the store-farmers in the low country, so that the same man carries them forward from their birth to the butcher. The draft ewes are also sometimes fed in the same manner, but more commonly they are sold lean to farmers in the low country, who keep them another year, fattening the lambs first, and the ewes afterwards.

The last practice is still adopted on many farms, though it is not so general as formerly. The ewes are brought from the Cheviot hills in September or October, put to a coarse Leicester ram, get a few turnips in winter, bring lambs in March, and are put on sown grasses where they make the lambs fat in June. The ewes are afterwards fattened on the same pasture, with the addition of the aftermath of the hay field, and if necessary a few turnips. This is what is called a *flying stock*.

It has been already noticed, that there are several situations around Cheviot, where a breeding stock cannot be kept; and when these farms are not conjoined with others in the occupation of one store-farmer, they must be employed in summering lambs, or wethers, which are sometimes sold annually like the ewe stock on better lands. Several farms of a similar description, are also exclusively appropriated to the wintering of hogs.

The pure Cheviot breed has been frequently intermixed with other races, particularly with the heath sheep on the one hand, and the Leicester on the other. But neither of these crosses are approved of for the pastures around Cheviot; by the former, the wool would be greatly deteriorated, and by the latter, the stock would be rendered too delicate,—though

it has been often alleged, that there is a dash of the Leicester blood in some of the best Cheviot stocks, especially where the practice is to rear tups for sale. When the Cheviot and heath breeds are intermixed, the ewes of the latter are put to tups of the former variety; and the ewes of the Cheviot breed, to tups of the Leicester, when a cross-breed is to be formed from these two varieties.

The Cheviot breed "has been gradually and very judiciously introduced into the higher parts of Eskdale, by crossing the blackfaced ewes with Cheviot rams; and late experience, in the farm of Clacklieth, in the highest part of Nithsdale, and situated on Wanlock and Crawick waters, has proved, that, in such a situation, that is the only safe mode yet known. The stock of the Messrs Tweedies, introduced in that way, is reported to be doing very well. The wool (of course) takes a part of its character from the blackfaced rams, and sells lower for some years, than pure Cheviot wool." "At present there is hardly any mountain flock in the county of Dumfries, of the pure Cheviot breed entirely unmixed*."

Upon the verge of the Cheviot hills a great many stocks have been formed from a cross between Leicester rams and Cheviot ewes. In such situations there is commonly a considerable portion of arable land. The ewes, and ewe and wether hogs, are depastured on the low hills, and the wethers are sold fat when about $2\frac{1}{2}$ years old, after being fed on turnips through the preceding winter. Both sorts of hogs are also kept on turnips in winter, and the breeding ewes are always allowed a few for a month or six weeks in spring. The weight, the form, and the fleece of these stocks, are somewhat intermediate between those of their dams and sires, according as the crossing has been continued for a longer or shorter period. Yet though Leicester tups have been employed in many instances for several years, and none

* Dumfries-shire Report, p. 359, 360.

of the cross-bred tups ever put to the ewes, the stock, though approaching nearer to the Leicester than to the Cheviot breed, is not exactly the same with the former, either in shape or quality of wool. The wool still remains shorter in the staple, and sells higher than that of the Leicesters, and the sheep are hardier, but do not attain maturity at so early an age; circumstances which prove the influence of feeding both on the fleece and carcase.

It does not seem of any utility to estimate the annual returns from these several descriptions of stock. The most accurate calculations would only apply to one year, and to one particular situation. The system of management, by which the annual sales must be regulated, and the prices of produce already stated, furnish data from which the reader may readily compute the average returns in money. And with regard to the produce of mutton and wool *per acre*, or from any given extent of land, there are not any two extensive farms to which the same estimate would apply. In some situations, an acre will fully support one sheep, on an average of the whole flock, and in others, at least, three would be required. So far as any such calculations have been made in the county reports, they shall be noticed in the Appendix. A store-farmer does not estimate the rent he can afford to pay by the acre, but by the number of sheep, of different ages, which any extent of land can maintain; and from this, compared with the prices of their yearly produce, he offers such a rent as, in many instances, of late years, has allowed him but a very moderate profit on his capital.

The superior value of a Cheviot to a blackfaced stock, consists chiefly in the wool. When they are smeared alike, the weight of the fleece is not materially different; and when kept on the same ground, it is confidently alleged, that the carcase of the blackfaced, is as heavy as that of the Cheviots. It is an undoubted fact, that the blackfaced are the most hardy in winter, and that a Cheviot stock is exposed to a greater loss of lambs in a severe spring, owing to their being

dropped almost naked. What difference there is in the numbers that may be kept on any given space of land, does not appear to have been fairly determined, and may probably depend upon the higher grounds being more or less accessible in winter, supposing the weight of the carcase of each breed to be nearly the same. The difference in the value of the wool is, however, so much in favour of the Cheviots, as to have introduced them into many very high exposed situations, the price of their wool being nearly three times that of the blackfaced; and this general preference would seem to prove, that a Cheviot stock is the most profitable, unless in very mountainous and heathy districts, where no provision of hay or turnips can be secured for the winter season.

SECT. IV.

THE LEICESTER OR DISHLEY BREED.

It is well known that this excellent variety was obtained by the skilful exertions of the late Mr Robert Bakewell of Dishley, from whose stock it has spread over all the well cultivated districts of the island. The late Messrs Culleys introduced these sheep into Northumberland many years ago, from whence they soon passed into the border counties of Scotland, Berwick and Roxburgh, where they have been long established on almost every arable farm. In most other counties they are also to be found in small flocks, in a less or greater degree of purity; and wherever convertible husbandry is practised in a skilful and systematic manner, they are considered as an indispensable part of the live-stock of every farm. They are exceedingly well adapted to arable land, from their being easily confined, maturing at an early

age, and returning a greater value in wool and carcase combined, for the food they consume, than perhaps any other breed of sheep in Britain. But they are, confessedly, not adapted to hilly districts, where the food is scanty, or must be collected with much exertion, of which these animals are altogether incapable.

“ The Dishley breed are peculiarly distinguished from all other long-woolled breeds, by their fine lively eyes, clean heads, straight broad flat backs, round (barrel-like) bodies, very fine small bones, thin pelts, and inclination to make fat at an early age: this last property is most probably owing to the before specified qualities, and which, from long experience and observation, there is reason to believe extends through every species of domestic animals. The Dishley breed is not only peculiar for its mutton being fat, but also for the fineness of the grain, and superior flavour, above all other large long-woolled sheep, so as to fetch nearly as good a price, in many markets, as the mutton of the small Highland and short-woolled breeds *.”

As this breed is so well known, and as, from its origin, a particular description of its properties belongs rather to an English than a Scotch Report, it is only necessary in this place to treat of it very concisely. The following observations are, for the most part, collected from the Berwickshire Report, and may be useful to some of the other counties of Scotland, where this breed has not yet been introduced.

1. The females are put to the ram when shearlings or gimmers, and bring their first lamb when two years old. The common period of copulation is from the middle to the latter end of October. Several of the principal breeders of the counties of Berwick and Roxburgh hold annual ram shows, at which they let out rams for the season, at prices rising from five guineas to a hundred for each. These high prices ren-

* Culley on Live-Stock, p. 105.

der it an object to those who hire them, to obtain as much of their services as possible, and with that view, the number of ewes, which it is expected each ram should serve, is selected from the flock, and confined along with him in a separate inclosure,—commonly from four to five scores of ewes to one ram. The ram is rubbed on the breast with *keel*, (a pigment of a red colour), that leaves a mark on the buttocks of the ewes that have been covered, which are then separated for a time from the parcel, that the remainder may have the better chance of being served. Another method is often followed with the highest priced rams,—who are confined to a small fold, and the ewes brought to them, one or two at a time, as they appear to be in season. This may be known by means of a *chacer* or *teazer*, (a wether sheep that had only one testicle in the scrotum at the time of gelding), marked on the breast in the same manner as the ram in the former instance. Sometimes an inferior ram is employed for the same purpose, with a piece of cloth so fixed as to prevent him from serving the ewes.

2. During the winter the breeding ewes and ewe-hogs are kept on the best pastures, as long as they can find a sufficient supply of food; after which they are provided with hay in racks on their feeding ground, especially in frosty weather, or if hay be scarce, they must be thriftily served with turnips. A moderate allowance of turnips is always given them in spring, for a few weeks before they are expected to bring forth their lambs; and if the weather be unfavourable after lambing, they must be supplied with turnips or ruta-baga till the grass rises.—The feeding stock are fully fed on turnips whenever the grass begins to fall off in the smallest degree. This stock consists of wether-hogs, dinmonts, and tups, and also of the *draft* or *cast* ewes, unless they are sold off grass. They are almost always confined in separate lots of ewes,—dinmonts, and wether-hogs, (or the two last in one lot), upon the turnip-field, by means of flakes or hurdles, or sheep-nets fastened to stakes; and though it is certain that turnips serve

longer when carted to a grass field, the sheep are found to fatten sooner when they eat them on the ground, and the land itself is at the same time so much ameliorated by their dung and treading, that turnips are very seldom given to dinmonts and cast-ewes on grass fields, except the weather be very wet and stormy. A grass field, however, contiguous to the turnips, upon which the sheep may lie clean, and return to the turnips at pleasure, is a valuable accommodation. It is very usual to place a hay-rack in the turnip field, though the sheep eat very little hay, except during hard frosts, when they are hardly able to bite the turnips. A hogs of this breed shed their teeth early in spring, it becomes necessary to cut their turnips afterwards, which is done by machine when the number is considerable, and they are served up in mangers.

3. The ewes drop their lambs, from the second week of March, to the second week of April, and at an average a third part of the flock have twins, or every sixty ewes bring eighty lambs. The males are always castrated, except such as are to be kept for rams, when only a few days old, and the whole lambs are weaned about the end of June. The wether-lambs are put on to full feeding, as soon as they are separated from their dams, and the ewe-lambs to pastures of an inferior description. The ewes are milked two or three times to ease their udders, but seldom or never with any view to profit, as in the case of the breeds already described.

4. The whole flock is shorn as soon as the growth of the wool, and the state of the weather will permit, beginning with the tups, dinmonts, and wether hogs, then the ewe hogs, and afterwards the breeding ewes. This operation is performed differently in this and in the smaller breeds. The shearer or clipper, raises the animal on its buttocks, and, beginning at the neck, clips in a circular direction from the belly to the back-bone, first with one hand and then the other. Some days before they are shorn, the sheep are carefully washed by men who stand in a running stream. Each sheep is hand-

to one of their number, who, after having repeatedly changed it, passes it to his neighbour, by whom the wool is carefully and repeatedly pressed and squeezed with the hand, and the sheep again plunged in every direction. From the second person the sheep passes to a third, who attentively examines the fleece, and finishes the operation. It is then dismissed, and a new one takes its place, every sheep passing through three hands or more in succession; the last person being the shepherd, or one in whom the owner of the sheep has confidence for skill and attention.

5. After the lambs are removed, the cast-ewes are drafted from the flock, and the gimmers brought in to fill their place. If the whole of the ewe-lambs have been kept, such of the gimmers as are ill-shaped, or defective in any of the points deemed essential, are put into the same lot with the cast-ewes, and disposed of along with them, as well as any of the ewes which are objectionable, whatever may be their age. The ewes are commonly disposed of when from three to four, or from four to five years' old, or after having had lambs for three or four years, and are either sold in September, to those farmers who keep what is called a *flying stock*, or are carried forward to turnips, and sold very fat about Christmas.

6. The Dishley sheep are never smeared like the smaller breeds, nor is there any need for this defence against the inclemency of winter, to sheep that are kept on low grounds, comfortably sheltered, and supplied at all times with abundance of food. To destroy vermin, they are bathed, when necessary, with a decoction of tobacco mixed with spirits of tar or brown spirits, and sometimes with a solution of the sublimed mercury.

7. The wethers of this breed, are never kept beyond the age of two years and a quarter, or until they are shorn a second time; and in Berwickshire they are very frequently sold a year younger. In both cases, they are put to the earliest and best pasture after turnips, commonly sown grass of the first year,—almost always clipped in May, and sold off in June. When

they are not sold till shorn a second time, the dinmonts are frequently kept upon sown grasses of the second year, the first year's being pastured by the young wethers till they are sent to market early in June, when the fields are shut up for a crop of hay.

On most farms, few or none of the lambs are sold, the whole being reared and carried forward to the butcher. The annual sales consist, therefore, of dinmonts or young wethers, weighing from 20 lbs. to 30 lbs. a quarter; one-third of the ewes, or more, with the worst of the gimmers, weighing, when fat, from 16 lbs. to 26 lbs. a quarter; and wool, of which 3 to 4 shearlings' fleeces, 4 to 6 of breeding ewes, and 2½ to 4 of rams, make a stone of 24 lbs., which has varied in price within these few years from 24s. to 30s. according to the demand. Last summer it brought very nearly the same price with the Cheviot wool.

In none of the County Reports, is the proportion stated between the live and dead weights of these several breeds; nor is there any account of experiments made in Scotland, respecting the weight of mutton gained from any given quantity of either grass or turnips. In Berwickshire, "an acre of rich old pasture is considered as equal to the full keep of five full-aged Leicester sheep for the six summer months, and an acre of very good turnips ought to keep ten such sheep for the remainder of the year in full meat. Hence, valuing the acre of pasture at L. 5, and the acre of turnips at the same price, the complete year's keep of a well bred sheep may cost 30 s. One material cause of the difficulty, in ascertaining the extent of land that will fully maintain a specific number of sheep, arises, from the mixture of stock that is generally kept upon pastures; and because pastures are stocked in succession, according to circumstances, with various descriptions of stock; and the stock

is in frequent fluctuation, some selling off as they grow fat, and others bought in to fill up vacancies *."

The breeding of sheep upon rich arable land, is a decisive evidence of a high degree of agricultural improvement. So little compatible are the habits of sheep considered to be with cultivation, that in some leases, in the less improved districts of Scotland, farmers are expressly prohibited from keeping any; and indeed it is scarcely possible to confine the mountain-breeds within ordinary fences, or to prevent them from destroying young hedges and plantations. A breed such as the Leicester, of a quiet, domesticated disposition, was therefore a vast acquisition to the arable land of Scotland. At the same time, while no other domesticated animal ameliorates both the pastures and turnip-fields so much as the sheep, such a variety as the Leicester, can only be kept with advantage in those situations, where improved husbandry has made considerable progress. At least, this must necessarily be the case in Scotland, where there is little rich old pasture, and where the climate requires that their food for six months in the year, must be provided by means of the plough. Turnips are an indispensable article to the success of these sheep in Scotland, and it fortunately happens, that they are no less necessary to the improvement of all thin dry soils. Without turnips, partly consumed by sheep on the ground, and without such sheep as the Leicesters, that can be easily confined on them by hurdles or nets, the light soils of Scotland, could never have been rendered nearly so productive in grain.

* Berwickshire Report, p. 402.

SECT. V.

THE FOREIGN BREEDS.

A FEW of almost every other variety of English sheep have been brought into Scotland, but only in small numbers, and none of them have hitherto excited much attention from farmers. They are confined, almost without exception, to the parks around the houses of proprietors, and form a very inconsiderable portion of the agricultural live-stock of the country.

It must appear from the former sections of this Part of the chapter, that all the mountainous and hilly districts, where sheep-farming prevails to any extent, are occupied by either the blackfaced heath-breed, or the Cheviot, and that the sheep kept on the pastures of arable districts, are chiefly of the Leicester variety. All of these seem well adapted to their respective situations, particularly the two last, which it might be very hazardous to dismiss for any other breed. At the same time, there is no doubt, that the farmers of Scotland, will readily embrace every opportunity, of profiting by crosses with a finer woolled breed, as soon as it is ascertained from experience, that the form and hardiness of their present stocks will not be materially injured. They have already planted the Cheviot breed in situations, where at one time they were thought to be altogether incapable of thriving; and by this means, the growth of finer wool in Scotland has been greatly extended. The price of Cheviot wool, however, has not of late years been such as to give much encouragement to the owners of this stock; and it were certainly of great importance, to improve its quality so far as to raise it to that degree

of fineness, for which the demand is more uniform and extended.

It must be considered, at the same time, that the sheep pastures of Scotland, do not admit of that variety of breeds, which are to be found in the southern division of the island. Neither on the hills, nor on the arable districts of Scotland, does there seem to be much room for any considerable numbers of a distinct race. The rigorous climate, and scanty, and, for the most part, coarse herbage of the former situations, prohibit the introduction of any tender and delicate breed, more especially if its carcase were greatly inferior to that of the native race; and in the arable districts, which are comparatively of small extent, convertible husbandry has been long deemed more profitable than permanent pasture, and will not therefore admit of any race of sheep, which are not completely domesticated, and easily confined.

For these reasons, any attempt to improve the quality of wool ought to be confined, in the first instance, to the mountain breeds, and particularly to the Cheviot; and that by means of crossing with a finer woolled breed, rather than by a total, or even a partial change of stocks. The breeds which are most likely to effect this improvement, are the South-downs and the Merinos, both of which were many years since introduced into Scotland.

1. "*The South-down breed* have no horns, grey faces and legs, fine bones, long small necks, low before, high on the shoulder, and light in the fore-quarter; the sides good, loin tolerably broad, but the back-bone too high; the thigh full, and twist good; very close fine short wool, from $2\frac{1}{4}$ lbs. to 3 lbs. a fleece; sold in 1792 for 2s. *per lb.*;" (which is much the same as the price has been of late), "the length of the staple from two to three inches *."

Such of these sheep as have been brought into Scotland, are certainly inferior in every respect to the Cheviots, except in

* Culley on Live-Stock, p. 156.

the quality of their wool, and when intermixed with Cheviots on hilly pastures they do not keep in so good condition, nor produce a fleece of greater value. Hence there is no reason to believe, that crossing the Cheviots with them would be attended with any advantage. The wool might indeed be improved in quality, but the quantity would probably be diminished considerably. They are not sufficiently covered to endure the storms of our northern climate, and would seem to be better adapted to the dry chalky downs, producing fine herbage, on which they are kept in their native districts, than to the alpine regions of Scotland. Besides, if the carcase of the Cheviot sheep should be in any degree endangered, it were probably better to hazard it for a more valuable fleece, than any cross with the South-downs could produce.

2. *The Merino breed* has already attracted much notice in England, and is to be found in several counties of Scotland. The South-downs and Cheviots have been crossed with Merino rams in several parts of this country, and the latter apparently with considerable success. A cross between the Merinos and Cheviots has been found to answer well by Lord Somerville, General Robertson of Lude in Perthshire, and others; and while the wool is greatly improved, the new variety is not deficient in hardiness. It seems to be ascertained beyond a doubt, that the wool of the pure Merinos does not degenerate in Scotland. Experiments are now in progress by Sir George Stuart Mackenzie, and Mr Macleod of Geanies in Ross-shire; by General Robertson, by Mr Malcolm Laing in Orkney, and by several other gentlemen; but there has not been time to ascertain the results so decisively, as to make it possible to estimate their success with any degree of precision, though the prospects at present are understood to be very encouraging.

In those situations where it might not be thought advisable to cross the Cheviot breed with the Merinos, either from a fear of deteriorating the form of the Cheviots, or of producing a variety not sufficiently hardy for their pastures, it may de-

serve consideration, how far a trial might be made, at first upon a small scale, with rams of the first or second cross between Merinos and Ryelands. Dr Parry, it is well known, has brought the wool of this variety to an equal degree of fineness with that of the pure Merinos, while the carcase is much better than that of the sire. His sheep have been for many years accustomed to the climate of England, and to the same management with the English breeds; and there is reason to believe from that gentleman's experiments, that his rams of the fourth cross, may be depended on for communicating their properties to their offspring. Instead of beginning with them, however, a cross with rams one-half or three-fourths Merino might be first tried; and by deeper crosses afterwards, the wool might be raised to any degree of fineness which circumstances might render advisable.

SECT. VI.

OF THE DISTEMPERS OF SHEEP.

THE distempers of sheep have been of late more attended to than those of cattle, though there is still much need for further information. The Highland Society, several years ago, offered their gold medal, of the value of forty guineas, for the best Essay on this subject, which called forth many valuable communications. These, after having been compressed into one memoir, by Dr Duncan *junior* of Edinburgh, were published in the Transactions of the Society. Mr James Hogg, one of the competitors, who has had long experience in the management of sheep, afterwards published "The Shepherd's Guide;" and more lately, Sir George Stuart Mackenzie has given to the public a very valuable "Treatise on the Diseases and Management of Sheep, with Introductory Re-

marks on their Anatomical Structure." Several of the county reports also, contain much information on this interesting subject. It is chiefly from these publications, that the following remarks have been collected, and it will therefore be unnecessary to quote them separately, unless when there is a difference of opinion among the authors, who seem, all of them, to have studied the subject with attention.

I. There are a few diseases peculiar to lambs, which may be mentioned in the first place. When the ewes are in high condition, and vegetation backward, the milk is strong and thick, the lambs are often seized with looseness, and the excrement, being of a gluey nature, fastens down the tail to the anus, and all passage from the bowels becomes intercepted. When shepherds observe this, they commonly seize the lamb, and, having washed and disengaged the tail, rub the parts with dry earth, which prevents the tail from again adhering to the hips. Hogs-lard or sweet oil would certainly answer better. This disease, or rather accident, is called *pinding* or *pinning*, and may be prevented in a great measure, by docking the lambs early. Some of the males will likewise fall, during the first ten days of their life, from an *inflammation of the bladder*, but this never happens but in cold barren weather, when they lie too long in one place. During the month of June, a few lambs are sometimes affected with a *stiffness of the joints*, occasioned by the low state of the dam at the time. A straggling lamb will sometimes die about this time of a kind of sickness, occasioned by mixing some kinds of grass too freely with the milk; this is called the *grass-ill*. Another cause of the death of lambs is *castration*. To prevent this, care should be taken that it be performed at a time when the air is free from electrical fire. Heating of them, too, is very often fatal; and the operator must, by all means, have recently abstained from spirituous liquors. The usual method of performing the operation, has been already described; the tail is then pulled two or three

times, and afterwards out; and the bleeding has certainly a tendency to prevent inflammation.

II. BRAXY or SICKNESS, is one of the most fatal distempers of sheep. It is for the most part confined to lambs or hogs, and begins to make its appearance earlier or later, according to the state of the weather, but commonly in October and November. In a *hog-fence*, or pasture, capable of keeping thirty score of hogs, there is, in some years, a loss of from three to four score, and there have been instances when the loss has been much greater. This disease is commonly so speedily fatal, that there is seldom time to apply any remedy after the symptoms have been perceived.

These *symptoms* are thus described by Mr Hogg:—"The first visible token of this distemper, which is alike applicable to all its cases, is the animal's ceasing to chew the cud, which it does sometimes for several hours before any thing else can be observed to ail it. As the distemper advances, the agony which the animal is suffering becomes more and more visible. When it stands, it brings all its four feet into the compass of a foot, and sometimes it continues to rise and lie down alternately every two or three minutes. The eyes are heavy and dull, and deeply expressive of its distress. The ears hang down; and when more narrowly inspected, the mouth and tongue are found dry and parched, and the white of the eye inflamed. The pulse beats strong and thick; the breathing is not very short, but attended with panting, and seeming difficulty; the urine is high-coloured, and the blood dark and thick."—"All sheep affected by braxy of any kind, will not bleed to any extent on opening a vein."

When the body is opened, there seem to be different varieties of this malady, but all of them exhibit marks of inflammation and mortification. According to these appearances, Dr Duncan, in the memoir already alluded to, divides braxy into two varieties; the *bowel sickness*, and *sickness of the flesh and blood*.

1. The *bowel sickness* is by far the most fatal; and that species of it which is the most common, has its chief seat in the stomach of the animal, constituting what nosologists term *gastritis*. In this variety of the disease, the belly is prodigiously swelled, the carcase much discoloured, and a sour pituitous matter is diffused through the whole system, especially the fleshy parts. The fat appears least changed; but although it melts to grease, it is always mixed with blood. The body, when opened, emits a strong sulphuric smell, and the stomach and bowels are much distended with fetid air, and appear of a red colour. The two first stomachs are least, and the third occasionally injured; but the fourth stomach (pylorus) is always thickened, often inflamed, and frequently mortified towards the intestines. The food in the stomachs, especially in the third, is so dry, that it may be crumbled into dust between the fingers. The kidneys are so much mortified as to resemble a mass of putrid gore; the liver is much affected, and the heart and lungs appear red and inflamed.

In a second species of bowel sickness, constituting the disease called *enteritis*, the stomach is little affected; but the small guts, where the disease is understood to have commenced, are mortified, black, soft, and almost rotten; and some think they have observed parts of them folded or double. The carcase is less swelled, not so blue nor putrid; but the food in the maw is very stiff and solid. To this variety, Mr Hogg has given the name of *dry braxy*.

A third species has been denominated by Mr Hogg and others, the *water-braxy*. On opening the body, the bowels are found swimming in bloody water, although none of it is contained within the intestines. The gall-bladder is contracted, nearly empty of bile, and the membranes which connect it with other parts are much inflamed. The primary bladder is empty or nearly so, and some red spots appear on the smaller apartments of the stomach, and as the disease in this variety seems to have its seat in the *peritonæum*, it has been

termed *peritonitis*. It is distinguished in the living animal, by the swelling of the belly hanging low, instead of rising upwards on each side of the back, as in the first variety, and by a feeling of fluctuation, when the hand is laid on the sheep's belly. This disorder is believed to originate in a suppression of urine.

2. *The sickness in the flesh and blood.* In this variety of braxy, the inflammation, instead of commencing about the stomach, takes its rise about some of the most fleshy parts of the body, or in the blood. In the former case, the flesh is quite tender and soft, and soon assumes a greenish hue; but in the latter, which is said to bear a strong resemblance to pleurisy, if blood be let, the carcase is but little injured. This species of braxy is said to be of the same nature with the *black spald* in cattle; and all the old sheep which die of braxy, as well as the hogs which fall in May, are carried off by it. Its ravages, however, may be computed as no greater than in the proportion of one to ten of those that die of the bowel sickness.

The braxy is most fatal on sudden changes from fresh weather to frosty. The difference in the temperature of the air, and the change from succulent food, to that which is dry and astringent, are the causes assigned by Mr Hogg and others for this disease. Dr Singer, in the *Dumfriesshire Report*, observes, that grass eaten when loaded with hoar-frost, has effects on the tender bowels of young sheep, similar to that of frozen potatoes, when eaten by cattle, which engender a large portion of noxious gas, and quickly bring on inflammation and mortification.

Several instances of cures are reported in Sir George Stuart Mackenzie's publication already mentioned, by means of blood-letting and cathartics. If blood can be made to flow freely, and purging be induced, there is every chance of recovery, but the disorder has generally proceeded too far before it is discovered. Mr Hogg recommends to give the diseased animal a severe heat by running, or to bathe it in warm

water eight or ten minutes, and then to inject water-gruel mixed with butter. But none of these experiments ought to be made in the case of the *water-braxy*.

It is fortunate, however, that, though the cure of this disease is but too often hopeless, there are measures of prevention, which are in the power of most farmers. Turnips, salt marshes, or any pastures which continue always fresh, are certain preventives of braxy; and of these the first is within the reach of almost every farmer, in the small quantity that is required, either by cultivating them himself, or by sending the sheep to a moderate distance. "The pasture of a very barren heath, and from three to four double-cart-loads of turnips *per* day, were found sufficient for 540 hogs. The turnips were supposed worth from L. 6 to L. 7 *per* acre, and eight acres of such turnips were sufficient for 540 hogs for about four months, not only totally preventing the braxy, but the sheep were found in very good order at clipping time. Less turnips would have done, if the sheep had had moss or ling to go to; but they had nothing, excepting some very indifferent dry heath. The turnips prevent costiveness and indigestion, which are the great causes of the braxy. On the supposition that 500 hogs are kept on L. 50 worth of turnips, with the liberty of pasture on the adjoining heath or common, the total expence would not exceed 2 s. a-piece*." If the expence were doubled, (and the turnips in other respects are of use), it would be trifling, compared to the losses that are often sustained by this disease.

There are other means of preventing braxy, which will probably be more readily adopted. The first is to *pasture the young and old sheep together*. By this plan, the disease is said to be almost eradicated in many places. The young of the flock share the experience of the old, and feed and rest at the same times. When it is indispensably necessary, from the number of the flock, to pasture the hogs by themselves,

* Caithness Report, Appendix, p. 186.

the second mode of prevention is, to choose the hog fence on a part of the farm which consists as nearly as possible all of the same kind of soil. On such a pasture, it is said the braxy is never destructive. The soil that most generally occasions braxy, is that on which *lee-heather* grows, that is, where heather grows upon a mould or gravelly soil; and if there is any of this within the bounds of the pasture, it should be carefully burned on the first opportunity. The next mode of prevention is the method of herding. Let them be stopped on the upper parts of their pasture for two hours in the morning; and by all means, let them not be suffered to remain too late on the grassy parts below, but again put in motion outwards, that the stomach may not be impaired by too immoderate fills of this soft grass. The last mode of prevention is, to bleed the whole parcel of hogs in the jugular vein, taking about two ounces of blood from each, about the beginning of November.

III. The *Hydrocephalus*, or *Water in the head*, commonly called the *Sturdy*, is the next disease which attacks sheep. A sheep affected by it becomes stupid; its eyes stare, and fix upon some different object from that which it is in fear of; it soon ceases from all intercourse with the rest of the flock; and is seen frequently turning round or traversing a circle.

As to the causes inducing it, it is generally allowed, that it is occasioned by sheep being exposed too much to rough and boisterous weather without shelter. It is almost peculiar to sheep during the first year of their age; older sheep rarely take it, without having been formerly affected.

The water settles sometimes in one corner of the skull, and sometimes in another; but wherever it begins, it continues to increase and gain upon the brain until it is either extracted, or till the animal perishes, at which period the brain is commonly half wasted away, and the skull full of noxious fluids. Sometimes it concentrates in the ventricles of the brain, and in the hinder parts, where it joins with the spinal marrow, in both of which cases it is deemed incurable. But in the

most common disease, the water is contained in cysts or bags unconnected with the brain, and may be often cured, either by extracting the bag by the operation of trepan, or by perforating it, and discharging the liquid by tapping. The former method requires too much skill, to be entrusted to any but professional men, but the latter is practised with considerable success by every shepherd.

The operation of tapping, is performed in two different ways, according to the seat of the disease. If it is any where on the crown of the head, the gentlest way is, to tap it in the place where the skull feels soft, and this is commonly done with an awl or large corking pin. But if the skull feel soft in the forehead, the operation must be performed by thrusting a stiff sharpened wire up the nostril until it stop against the upper part of the skull. If this cure were not well authenticated by daily observation, it might seem a very severe and dangerous operation, as the wire goes quite through the brain in two different places, yet a far greater number are cured in this way than in any other. The operator must feel for the part of the skull that is soft, and lay his thumb flat and firm upon it; then taking the wire in his right hand, he thrusts it up that nostril that points more directly for the place that is soft, where the disease is seated; and if he feel the point of the wire below his thumb, he may rest assured that the bag is perforated, and that if the brain do not inflame, the animal will recover; but if he does not feel the point of the wire press against the soft part of the skull, on which the thumb of the left hand must be placed, it will be necessary to try the other nostril.

If the sturdiness is not at all to be felt by pressing with the thumbs, it is either seated in the ventricles of the brain, or behind, and nothing can be done but with the wire. As desperate diseases require desperate remedies, the wire may be thrust up one or both nostrils in the manner already mentioned.

After a sheep has been *wired*, it is proper to take hold of

it with both hands behind the ears, and shake its head a little. This empties the bladder, and the water must find its way by the nostrils afterwards, for they will frequently grow better though no water be seen to issue from the nostrils at the time. If the animal sickens after the operation it is a good sign; but if the sickness continue for two days, it is likely to die, and ought therefore to be immediately killed, if in good condition, as the flesh is not materially injured. Bleating is a sure sign of recovery.

IV. DIARRHOEA. This is another disorder to which young sheep are liable; it is commonly denominated the *Rush*, and is occasioned by a sudden flush of grass in April or May, but it is not attended with danger, unless they are very low in condition. When the flux is moderate, change of diet, from soft to dry food, for a few days, may effect a cure. But if the purging be considerable, half an ounce of chalk may be given in an English pint of cow's milk, a little warmed, or they may get a little corn or meal for a week or two. This is quite a different disorder from the dysentery, to be afterwards noticed.

V. The next disease is known by various local names, and preys upon young and old, and middle-aged. It is denominated the *Thwarter-ill*, the *Trembling*, and the *Louping* or *Leaping-ill*, names which probably, at one time, meant different diseases. "Under this triple name," says Mr Hogg, "I have seen them suffering by diseases which, at least, had much resemblance to the following: Rheumatism, ague, palsy, and apoplexy; and even when an old sheep falls down and dies of weakness and debility, the manner of their death differing somewhat from that of hogs, it was frequently ascribed by shepherds to the *trembling* or *thwarter-ill*." These disorders were very prevalent about twenty-five years ago, but they are now almost eradicated by better management. They still prevail, however, on some dry farms, where the

ground is visibly overstocked, but chiefly in frosty weather, when the spring is cold and late. The *leaping-ill* has been long known in the county of Roxburgh, and on a few farms has almost extirpated the flocks. The predisposition to this disease, occasioned by the quality of the pastures, and the poverty of the animals, is frequently brought into action by any unusual exertion in running or leaping, and the disease is commonly fatal. When they fall down suddenly, and threaten to expire, bleeding has sometimes afforded relief; and in all cases, it is advisable to remove those that are affected to better pastures, on which, if they survive for a few days, they are in little danger of a relapse.

VI. The DYSENTERY, known among shepherds by the names of the *Breakshuach*, *Breckshaw*, and *Cling*, is a most infectious disorder, which wastes the body with such rapidity, that though a sheep be fat and strong when infected, it is reduced to a mere skeleton in a few days. If sheep are overheated by running or folding, at a season of the year when they are mending fast in condition, they are in the utmost danger of this disease, for a burning heat having been raised in the blood and bowels, they are apt to drink greedily of cold water, while the pores of the body are all open. This brings on a dysentery, or rather a bloody flux. The excrement becomes quite liquid, of a greenish colour, at times mixed with blood, and emits a strong fetid smell. The animal separates from the flock, and drinks with avidity, if water is within its reach. It neither eats nor chews the cud, and a frequent rumbling noise is heard in its bowels.

If the distempered sheep cannot be confined at a distance from the rest of the flock, it is advised to smear them with tar and turpentine, which, it is said, prevents the communication of the infection to others. But, if possible, they should be confined in a place where there is no water.

A cure has been effected in several instances by bleeding, administering doses of salts, rhubarb, ipecacuanha, logwood,

and laudanum. Eggs and sweet milk mixed with the bark of the alder-tree have also been given with success.

Mr Hogg ascribes this disease entirely to over-heating the animals, and the means of prevention are therefore sufficiently obvious. He very justly and forcibly condemns the still existing practice of milking the ewes, as one of the principal causes of this and several other disorders.

VII. The *Scab* or *Itch* is a well-known infectious and troublesome disease. It seldom appears among sheep that have been smeared, unless they have been infected by others; and this infection may be communicated not only by contact, but by the stones, trees or banks, on which scabbed sheep have rubbed themselves several months before. A sheep is never even slightly affected till it proceeds to scratch itself, and to rub its sides and buttocks against every thing it meets. As soon as the disease is discovered, the whole flock among which the animals affected have been pasturing, should be carefully examined, and every one which has an appearance of being fretted on the skin, must be separated from the flock, and kept by themselves till completely cured. Several methods of cure have been prescribed, two of which shall be extracted from Sir George Stuart Mackenzie's Treatise before-mentioned :

“ Take of strong Mercurial Ointment, 4 lbs. ;
 Oil of Turpentine, - - - $\frac{1}{2}$ pint English ;
 Hog's-lard, tallow or butter, - 4 lbs. ;

Melt the hog's-lard, tallow, or butter. Allow them to settle, and pour off the clear liquid ; then add the mercurial ointment, stirring the whole well, till it be melted and incorporated, and then add the oil of turpentine. Keep stirring the mixture for a minute or two, that the mercury may be completely mixed, and then pour the whole into some shallow vessels, that the ointment may cool quickly.”

“ A very effectual and a much cheaper ointment may be made as follows :

Take of Corrosive Sublimata,	-	8 ounces ;
Train Oil,	- - - -	6 gallons English ;
Rosin, (Black or Yellow),	-	2 lbs. ;
Tallow,	- - - -	2 lbs.

Let the corrosive sublimate be reduced to a fine powder, and mixed with a portion of the oil. The rosin, tallow, and remainder of the oil, are to be melted together over the fire, and the sublimate afterwards added." If the mixture is too thin, the oil may be diminished, and the tallow increased. One pound of sublimate at 10 s. will in this way go as far as 50 lbs. of mercurial ointment at 3 s.

The skin of the animal should be well brushed and washed with soap and water before the application of the ointment, which may then be laid on in the same manner as the salve in the smearing operation formerly described, though it will seldom be necessary that the rows should be so numerous.

A much cheaper and speedier remedy, which is commonly effectual, is a decoction of tobacco with spirits of tar or brown spirits. Put a table-spoonful of the latter into a common quart bottle of the former, and pour the mixture on the skin of the diseased animal through a quill inserted in the cork of the bottle. The shepherds of the low country have this preparation always at hand ; and whenever any marks of the disease are observed, they immediately seize the animal, shed the wool, and apply this mixture.

VIII. The LEG-ILL or *Black-leg*, is a term frequently used to distinguish a species of the thwarter-ill ; that which resembles the rheumatism, when the animal sometimes carries one limb, and sometimes another. The joints of the infected limb grow up and swell, and the animal continues to pine gradually away. When the infected joint is opened, a mass of stiff livid matter is found within, among the sinews, and all around the bone ; and though the animal has been sufficiently blooded, a considerable quantity of dark coloured blood is

always found in man^{cavities} close by the joint, which gushes out when cut. A ~~sease~~ which, in Mr Hogg's opinion, is more properly dominated the *Leg-ill*, sometimes seizes sheep on the ver^{right} after they are shorn, and is occasioned by their lyin^{on} foul ground. This most commonly affects the ham, ^{hinder} thigh, and often carries them off in one day. Si^r George Mackenzie considers this disease as very infecti^{ous} and recommends that the sores should be dressed wit^h some caustic ointment, and the limb afterwards wrapped iⁿ cloth spread thinly with the scab ointment.

IX. ^{the} STAGGERS is a name sometimes applied to that species the *thwarter-ill* which resembles apoplexy, in which the ^{animal} falls instantly down and tumbles about; it is apt to b^erought on by any sudden exertion, and copious bleed^{ing} the best cure. Another kind of distemper which goes by the same name, seems to be a paralytic affection. The ^{affected} animal holds up ^{its} head in a fixed and convulsed position, and when it endeav^{ors} to move forward, staggers one side or runs backward. It s^{eems} to move forward, staggers sheep that feed in woods are also subject^{to} occurs in Scotland. the staggers, appearing as if intoxicated, but the^{re} are fits of ver, unless a shock of the apoplexy is induced by fume^{of} blood, or sudden exertion. Nothing occasions this temporary stupor more frequently than a hearty feed of broom in frosty weather, which so overpowers them that they will sprawl for several hours as if in their last throes.

X. The *Pining*, *Daising*, or *Vanquish*, is a disease most severe on young sheep, but it is almost confined to some districts in the west of Scotland, where the pasture is very coarse; a removal to better pasture, especially such as has been recently limed, cures them immediately, and they never fail to become excellent sheep, and remarkably healthy.

XI. The *Head-ill*, or *Great-head*, seems to be peculiar to

some flocks that feed on the higher mountains of Scotland, and may be occasioned in some situations by the bite of venomous reptiles, and in others by some deleterious herbage. When it is owing to the latter cause, the animal recovers if speedily removed to better pastures.

XII. *Blindness* is occasioned by excessive fatigue, for which sheep are sometimes blooded below the eyes, but they recover of themselves, if allowed to feed at their ease. For this purpose, and also to prevent accidents, they should be kept in a separate inclosure.

XIII. *Dropsy*. "In some of the islands and shores of Scotland," says Mr Hogg, "where sheep feed much upon salt marsh, this distemper is peculiarly destructive." "In some of the Orkney and Shetland Islands, it destroys more than all other diseases; and on the shores of Sutherland and the Long Island, its depredations are considerably frequent." "Removing them to the pasture, and back from the shores, is certainly the best means of preventing it."

The *Pelt-rot* is rather an accident than a disease. When sheep are very lean, and exposed to frequent rains, or to drops from trees, the wool falls off during the spring months, and a whitish crust gathers upon the skin, by some called the *pelt-rot*. The part of the skin that is hard should be well rubbed with tar mixed with oil or butter, and a piece of cloth sewed over it, to preserve the animal from cold.

XV. *Red-water* is a cutaneous disease, which makes its appearance about the beginning or end of winter, and chiefly affects the breast and belly, although at times it spreads itself over other parts of the body. The skin is raised into blisters, which contain a thin, reddish and watery fluid. It seldom appears in this country, and is almost never fatal.

XVI. *Erysipelas*, or *Wildfire*. This is also a cutaneous disease, and if not attended to spreads very quickly among the flock. It commonly appears in the months of August and September, and does not continue above eight days at a time. It differs from the *red-water* in being attended with more inflammation, and but seldom with blisters. Salts, nitre, and a composition of sulphur, honey, treacle or syrup may be given with good effect in both of these diseases, which are but little known in Scotland.

XVII. *Foot-rot*. This disorder attacks sheep that feed on wet and soft land, and such as are folded on foul ground; and it spreads so rapidly, that there is reason to believe it highly contagious. It is also at times occasioned by the sheep feeding alternately on wet and dry ground, in warm weather, which at first causes a few small cracks about the roots of the hoofs, which, by being wetted and dried several times every day, soon enlarge and suppurate; a sharp fetid humour exudes, which corrodes the flesh, and even the bone. In either case it degenerates into a foul and tedious ulcer, renders the sheep extremely lame, forces them often to walk or rather creep on their knees; the hoofs drop off, and in some instances the foot rots and falls off altogether.

When a sheep is first observed to be affected by this disease, the sore foot should be washed with soap and urine, then well bathed with turpentine, or caustic ley of potash or soda. The ulcer may be afterwards filled with scraped linen dipped in Goulard cerate; or, after the washing, the diseased parts may be rubbed all over with tar. The foot must then be preserved from foulness by a bandage, or a small boot with a leathern sole. Powdered quicklime has been long applied as a caustic, with good effect, when the disease has not made great progress. After the hoof is pared as far as necessary, and carefully washed, the sheep are made to stand upon the lime, and are often cured without any further application. It has also been of advantage to plunge the foot

repeatedly into hot water. The *foot-rot* is by no means a dangerous distemper among the native sheep of Scotland.

XVIII. "*Jaundice*," says Sir G. Mackenzie, "is a rare disease. It is known by the skin and eyes becoming of a greenish yellow colour. It is occasioned by the rupture of some of the vessels secreting the bile, or conveying it to the stomach and intestines. The bile being diffused through the body, causes the colour peculiar to this disease. Bleeding is useful; and a dose of jalap, with perhaps a few grains of calomel, will be of service; exercise is very efficacious."

XIX. The Rot. This terrible distemper was formerly more prevalent in Scotland than it has been of late; yet in some seasons, and in particular situations, its ravages are still very extensive.

There is much difference of opinion as to the cause of this disease. By some it is referred generally to unwholesome food *, and to deficient as well as depraved aliment †; and by others to the ova of insects taken into the stomach, from which flukes are afterwards produced ‡; while a medical writer ascribes the rot to marsh miasmata §, and an experienced shepherd to a sudden fall in condition §.

Whatever may be the primary cause, the proximate one is less doubtful, and it is to that alone that it seems most proper to attend in a work of this description.

The rot seldom or never attacks sheep on dry land, but it has been found to affect sheep that were before healthy, almost immediately on their being sent to feed on soft wet pastures. Land that has been recently flooded in summer is

* Sir G. S. Mackenzie's Treatise on Sheep, p. 67.

† Coventry's Introductory Discourses, p. 147.

‡ Parkinson on Live Stock, vol. i. p. 419.

§ Harrison on the Rot *passim*.

§ Hogg on the Diseases of Sheep, p. 197.

a very common cause of rot, though the same effect would not be produced by feeding on the same land, after being flooded in spring. "Mr Bakewell was of opinion, that after May-day, he could communicate the rot at pleasure, by flooding, and afterwards stocking his closes, while they were drenched and saturated with moisture *;" and there are many well-authenticated instances of the rot having been occasioned by a few minutes' feeding on pastures in a similar state. It is on the circumstance of excessive humidity, accompanied by exhalations raised in hot and sultry weather, that Dr Harrison seems to found his hypothesis respecting paludal effluvia being the cause of rot; but there is every reason to think, that the rot is often engendered at a time when the weather is by no means so hot, merely by feeding on soft marshy pastures. The disease cannot be often ascribed to flooded lands in Scotland, where irrigation is but little practised, and its mountain rivulets seldom overflow any considerable track on their banks, which are commonly steep and precipitous; or, when more level, kept under tillage rotations.

A course of changeable weather, fresh and frost alternately, is certainly a frequent cause of the rot; and mild, rainy winters, when vegetation has been seldom checked by long continued frosts, are very dangerous to many of the mountain flocks, especially if vegetation has been unusually vigorous towards the end of autumn and beginning of winter.

With regard to the impregnated ova of insects being taken into the stomach, it is observed, that *fasciolæ hepaticæ* are sometimes found in sheep that are not affected with the rot, and that in some instances no such insects could be discovered in the livers of rotten sheep. The process which the food must undergo in its several stages, after being brought up from the first stomach, seems to be a serious objection to this

* Harrison on the Rot, p. 26.

hypothesis, and there is another circumstance that for the present must be held a decisive one against it, namely, that these fasciolæ are not to be found on the pastures, or any where but in the sheep themselves.

The first symptoms of rot are lethargy and loss of appetite, which are often the consequence of hunger, fatigue, and cold or wet layers. The belly afterwards appears shrunk up, and then they fall to their meat with great voracity. As long as their bellies continue light, they have not quite fallen a prey to the disorder, and a bite of broom, heath, or sea-marsh, once or twice a day, or salt, may restore them. After this, the belly falls down, and the flanks fall in, which are worse symptoms, and denote that the disease has made too great a progress to be radically cured, especially if the sheep are in high condition. The rot may be also discovered before it has proceeded far, by the hand applied to the animal's back or ribs. If a slight crackling is felt, as if there were small dry bladders betwixt the skin and flesh, the rot has commenced; but if the sheep be firm on the back, and the skin refuse to slide on the flesh, it is still sound. If the eye is streaked with red veins, there is no danger; but, on the contrary, if it is of a yellowish colour, and watery, the sheep is certainly unsound. A watery swelling below the jaws, though a concomitant of the rot, is not a certain sign that the animal is lost. Nursing ewes are less liable to the rot than other sheep.

When a sheep is killed during the early stages of the disease, about the time when the flank falls in, the fasciolæ or flukes are only to be found in the ducts of the liver. The liver itself is much swelled, and the fat that covers the bowels and kidneys is loose and flabby; one half, or at least one third of it, will not melt. The tallow is so loose, that it will not separate from the skin, and about the short ribs it is of a pale colour, bordered with a tinge of yellow. Their flesh, when cold, does not grow firm, nor when boiled tender. The blood is thin, frothy, and light coloured. When

they die of the rot, all these appearances are much aggravated, the liver in particular being a horrible mass of corruption.

The means of prevention are, draining, shelter, regular maintenance at all seasons, for which purpose hay should be provided if possible; and the pasture should be rather understocked. Purgatives have been recommended in the first stages of the disease, and afterwards mercury applied externally to the bare skin on the region of the liver.

Besides these, and probably several other local diseases little known, sheep are liable to external accidents, some of which are almost peculiar to them, and occasionally productive of much loss; and they are often greatly distressed by vermin.

The *ked* or *sheep-louse* attacks sheep of all descriptions, but chiefly hogs that are in an unthriving state. They breed mostly about the throat, and occasion the sheep to bend its neck so much, to be relieved from their attacks, that the teeth often fasten in the wool, so that it cannot disengage them, and if not soon relieved, the animal perishes. They seldom or never prove fatal of themselves, for all the various salves that are used for sheep destroy keds; but if any white or unsmeared spot is carelessly left, they soon find it out and nestle upon it. Ewes and wedders, though not smeared, if in good condition, seldom suffer much from keds.

Ticks, when full grown, are six times larger than *keds*, but not so general over the country. This insect, like the *ked*, is of a flat form; of a brown or livid colour with some light specks on its back. It has six legs, and a flat proboscis, with three notches, like the teeth of a saw, on each side; with this it insinuates its head beneath the skin of the sheep, where it continues to suck blood, and swells for weeks and even months together. They only fasten on such parts of the animal as have little or no wool upon them. They are easily destroyed by tar or turpentine; but on ground where

they prevail, it is but a very short time until they gather again. They are constant attendants upon the *Thwarter-ill* or *Leaping-ill*; "wherever that disease prevails," says Mr Hogg, "the ticks prevail, and where there is nothing of the one, there are none of the other."

Maggots are more dangerous than any other vermin, and will occasion death in a few days. They commonly appear first about the root of the tail, from which they spread rapidly over the body, sometimes falling down towards the flanks, where they nestle below the skin, and often eat into the entrails; and sometimes they spread along both sides of the back-bone, consuming the skin and fell as they proceed. The sheep which they attack may be easily discerned, even at some distance; they hold down their heads, shake their tails, seem quite impatient, and often run with violence from one place to another; but in the last stages, they grow quite callous and hopeless, and lie close to the earth till death puts an end to their sufferings. Many high lying districts are but little troubled with maggots; but when the weather is sultry and warm, the shepherd of the low country must always carefully inspect his flock once a day, or oftener. They are speedily destroyed by a solution of corrosive sublimate, to which a little turpentine may be added. The mixture is poured upon that part of the carcase where the maggots nestle through a quill inserted in the cork of the bottle. If they have been allowed to eat into the flesh, it may be proper to clip off the wool and apply a mixture of tar and butter, but it is by no means necessary to disfigure the animal, and waste the fleece in ordinary cases.

Flies of different kinds are often extremely troublesome and even dangerous. They penetrate the skin, and clustering about the wound, soon enlarge it considerably. They are most offensive on low-lying, and woody pastures, and readily fix on any small wound given in shearing; they are also very troublesome to the heads of lambs of the large breeds, which must often be secured from their attacks by

cap or bandage. A composition of one pint of tar, and four of train oil, applied to the parts likely to be affected, has been found to give an effectual security against flies.

Among the accidents peculiar to sheep, what is called *awald* or *awalding*, deserves to be noticed on account of its frequently proving fatal. It is most apt to happen when it grows warm after a shower, any time from the beginning of May until the sheep are shorn. The sheep lie down and turn themselves over on their back to rub, and when the ground happens to be level or somewhat hollow, the bulk and weight of their fleeces disable them from recovering their feet; in this state they soon swell, and die in a few hours if not assisted. This accident happens more frequently with the larger than the smaller breeds.

It has been already mentioned, that a number of sheep are often lost in severe snow-storms. This is called *smoor*ing or smothering, and may be prevented in a great measure by belts or clumps of trees planted in proper situations. Even stone-walls inclosing a circular area, octagon, or other particular form according to the situation, have been found exceedingly useful as a security against the driving storm.

PART III.

HORSES *.

IN all cultivated districts horses are much less the creatures of soil and climate than cattle or sheep. The same kind of labour, though different in degree, is required from all horses kept for the purposes of agriculture; and the food necessary for enabling them to perform this labour is provided by means of cultivation. The husbandry horses of Scotland cannot be divided into a number of distinct breeds or races; they are chiefly distinguished by their size, which must be somewhat different according to the labour they have to perform, and, in particular, to the nature of the soil, the acclivity of the surface, and the number of distant carriages. Their form also requires to be a little varied to suit the different purposes of strength and activity. Farmers who breed horses choose the males and females which promise such an offspring, as each in his own particular situation con-

* The general name of the male is *stone-horse* or *stallion*, or simply *horse*; and when castrated he is called a *gelding*. When sucking he is a *colt-foal*; then a *yearling colt*; afterwards a *two* or *three-years-old colt*, until *four*, when he is most commonly called a *horse*.

The female is called a *mare*; when sucking, a *mare* or *filly-foal*; then a *yearling filly*; afterwards, a *two* or *three-years-old filly*; and at *four* has the name of *mare*.

Horses have twelve fore-teeth, six in the upper, and six in the lower jaw. Their age may be known by the teeth of the under jaw in particular. Between the age of $2\frac{1}{2}$ and 3 years a horse casts two fore-teeth above and two below from $3\frac{1}{2}$ to 4 years, he casts 4 more; and between $4\frac{1}{2}$ and 5 years, he casts the remaining 4, which are called the corner teeth. The black speck in the corner teeth commonly remains till the age of 7 or 8 years, after which the tusks must be consulted, in order to judge of the age, which cannot, however, be accurately determined, after the speck or bean is worn out.

siders most suitable, either for his own labour or for sale, without much regard to any specific breed. The form and the size are the only objects of selection, and it is too generally the practice to confine this selection to the male, and to breed from females every way objectionable, and often deemed of no value for any other purpose. For these reasons, it is impossible to discriminate the horses of the cultivated counties of Scotland by appropriate appellations. In the Highland districts, however, where horses are but little more domesticated than cattle, and in a few other situations where there has been little intercourse with strangers, the breeds are evidently different from those of the low country.

Another circumstance, which has contributed to abolish the distinction of breeds in the arable districts of Scotland, is the small number of horses reared by any one individual. Cattle and sheep are bred according to a regular system, as the principal, and in many situations, as the only source of profit; but the breeding of horses, even in those districts where the greatest number is reared, is generally considered as nothing more than an incidental or occasional branch of husbandry. This circumstance, which serves to account for the intermixture of different races, has also prevented any regular course of feeding and management from being generally adopted,—every individual being in a great measure determined, in respect to the treatment of his breeding mares and young horses, by the circumstances of his situation.

The prices of horses, however, have of late become so high, that much attention is now paid to the improvement of this noble animal. In no country are there horses better adapted to all the purposes of the husbandman than in Scotland; the same labour is nowhere performed at less expence; and in attention to the health and comfort of his horses, the Scotch farmer is not exceeded by his brethren in any part of the island.

It is not the object of this division of the Chapter to

give an account of any other horses than such as belong to the husbandry of Scotland; and in treating of these, the following arrangement has been adopted. I. The different breeds, in so far as they can be distinguished, and then the manner in which they are bred and reared till put to labour, shall be described. II. It will next be necessary to state the labour they perform, and the expences of their maintenance; and in this Section reasons may be assigned for the general preference given to horses over oxen for agricultural labour: And III. The most common distempers of horses may be mentioned very concisely; this department of the veterinary art having engaged the attention of professional men, in a greater degree than the distempers of cattle and sheep, it is not to be expected that any information can be communicated in a work of this nature of much interest or utility.

SECT. I.

OF THE BREEDS, AND THE BREEDING AND REARING, OF HORSES IN SCOTLAND.

THE several varieties of horses in Scotland may be arranged under three general divisions; First, The small Highland horse; Second, The Galloway; and, third, The mixed breed of the low country, commonly known by the name of the Clydesdale breed.

1. *The Highland Breed.*

The small horses of the Highlands and Isles of Scotland are distinguished from larger breeds, by the several appellations of *Ponies*, *Shelties*, and in Gaelic of *Garrons*, or *Gearrons*; they are reared in great numbers in the Hebrides or Western

Isles, where they are found in the greatest purity. Different varieties of the same race are spread over all the Highland district, and the Northern Isles. This ancient breed is supposed to have been introduced into Scotland from Scandinavia, when the Norwegians and Danes first obtained a footing in these parts. "It is precisely the same breed that subsists at present in Norway, the Feroe Isles, and Iceland, and is totally distinct from every thing of horse kind, on the continent of Europe, south of the Baltic *." In confirmation of this, there is one peculiar variety of the horse in the Highlands that deserves to be noticed. It is there called the *eel-backed* horse. He is of different colours, light bay, dun, and sometimes cream-coloured; but has always a blackish list that runs along the ridge of the back, from the shoulder to the rump, which has a resemblance to an eel stretched out. This very singular character subsists also in many of the horses of Norway, and is nowhere else known †."

The Highland horse is sometimes only nine, and seldom twelve hands high, excepting in some of the southern of the Hebrides, where the size has been raised to 13 or 14 hands by selection and better feeding. The best of this breed are handsomely shaped, have small legs, large manes, little neat heads, and are extremely active and hardy. The common colours are grey, bay, and black, the last is the favourite one.

With regard to the breeding and rearing of the Highland horse, the following remarks are extracted from the recent report of the Hebrides, and will apply, without any material variation, to other Highland counties.

"In general, the tenants pay no manner of attention to their stallions or breeding mares, but leave them almost en-

* The horses of Wales, and generally of all the hilly districts of Europe, have a near resemblance to the Highland Garrons.

† Walker's Hebrides, vol. ii, p. 158.

tirely to chance. In summer, and early in autumn, one half of the horses and mares range freely and unconfined amidst the mountains, whence they are not brought to the different farms and hamlets for work until the harvest is ended, the crop to be carried home, and the peats or fuel to be secured. They are then hunted after like so many wild beasts, and each tenant or proprietor endeavours to procure his own, which he has not perhaps seen for many weeks before. They are driven into inclosed fields or pen-folds, frequently into bogs or morasses, before they can be laid hold of, and sometimes injured severely in the process. Their manes are then cut, the hair laid up for rope-work, and other purposes, and the young horses are gradually broken in for the labours and cruel hardships of winter. Very few are housed, or in any other way protected from the inclemency of the weather, and the rigours of a scanty and unsheltered pasture, than merely by a winter inclosure, fenced with a miserable turf dike or wall, along the sides of which they stand shivering with cold, and half famished with hunger, the live-long winter nights. Any horses brought from other districts of Britain, to undergo this treatment all at once, fall off rapidly, and soon perish *."

It is unnecessary to add, that by far too great a number is kept on any given space of land, particularly in the kelp islands; that their labour is precarious, irregular and desultory; and that though the value of their food and harness is very small, probably does not exceed L. 4 or L. 5 yearly, the expence of labour in the Highlands is perhaps as great, or greater than in the low country, where the maintenance of a horse cannot cost less than nine times that of a *garron*.

This ancient race has been frequently crossed with large horses from the low country; and where improved cultivation has been adopted in the north of Scotland, it is common to rear such horses, or to purchase them from the arable dis-

* Macdonald's Report of the Hebrides, p. 469.

Tracts. A better method, at least for the small tenants of the Highlands and Isles, would be to improve the native breed in the first instance, by selection, and an abundant provision of food, both in summer and winter. Their horses might then become sufficiently large for their present purposes, which require activity and hardiness more than great size and strength; and in the farther progress of improvement, a cross with a middle-sized horse of the low country breed, might supply what was wanting in the latter properties, without materially diminishing the former. As a necessary prelude to such improvement, the numbers must be greatly reduced;—their additional labour will more than repay the expences of better feeding;—and while cultivated grasses, and turnips and ruta-baga, would secure both their horses and cattle against the usual privations of a long winter, and a late spring, the succeeding crops of grain would give a much more abundant produce both in corn and in fodder.

II. *The Galloway Breed.*

The province of Galloway formerly possessed a breed of horses peculiar to itself, which were in high estimation for the saddle, being, though of a small size, exceedingly hardy and active. They were larger than the ponies of Wales, and the north of Scotland, and rose from twelve to fourteen hands in height. The soils of Galloway, in their unimproved state, are evidently adapted for rearing such a breed of horses; and in the moors and mountainous part of the country, a few of the native breed are still to be found. The true Galloways resemble the Spanish horses in some very characteristic features, particularly in their faces. This similarity makes it probable, that the breed has been indebted for its improvement, to the Spanish horses that are supposed to have escaped from one of the vessels of the Armada, that had been wrecked on the coast of Galloway.

This ancient race is almost lost, since farmers found it necessary to breed horses of greater weight, and better adapted

to the draught. But such as have a considerable portion of the old blood, are easily distinguished, by their smallness of head and neck, and cleanness of bone. They are generally of a light bay or brown colour, and their legs black. The name of *Galloway* is sometimes given to horses of an intermediate size between the poney and the full-sized horse, whatever may be the breed.

III. *The Clydesdale Breed.*

The Clydesdale or Lanarkshire breed are a mixed race, of the origin of which various accounts have been given, none of them so clear and distinct, nor so well authenticated, as to merit any notice. The name has been given them, not because they are bred in the county of Lanark alone, for the same description of horses are reared in the other western counties, and over all that tract which lies between the Clyde and the Forth, and also in the counties of Peebles and Selkirk; but they have been known by this name, from the principal markets at which they are sold. They are procured at the age of one or two years, at a fair in Lanark, and another in Carnwath, about six miles above Lanark, held in the month of August, and beginning of September; and when five years old, great numbers are resold by their former purchasers, at the fairs of Rutherglen and Glasgow, in the latter end of May, or beginning of June, to horse-dealers and farmers from the Lothians and Border counties. Many of them are carried every year from these fairs to Carlisle, and other parts in the north of England.

1. The Clydesdale horses are usually between 14 and 16 hands high, and of a black, brown, or grey colour. A white spot on the faces of those that are black or brown, is esteemed a mark of beauty; and a small patch of white on one or more of the legs is very common. But when the leg immediately above the hoof is of a white colour, the hoof is also white, and a white hoof is never so firm and durable as a black one. The shapes of the best horses are not objec-

tionable, though many of them are plain about the head, sides, and hind legs. The head is not of an undue size; the nostrils are wide, and eyes full and animated. The neck is strong and fleshy, with a good curvature, and the mane thick and bushy. He is broad in the breast, thick in the shoulder, the blades nearly as high as the chine, and not so much thrown backwards as those of road horses. The leg rather short, but strong and clean. The hoof round, of a black colour; and the heels wide. The back straight and broad, but not too long. Hucks visible, but not prominent, and the space between them and the ribs short. The thighs thick, and meeting each other so near, as to leave only a small groove for the tail to rest on. The tail heavy, and well haired. A large sheath is considered as the mark of a good horse, and a small one the reverse. One very valuable property of the Clydesdale horses is, that they are remarkably true pullers, a restive horse being rarely found amongst them.

2. It has been already observed, that these horses are not bred in considerable numbers by any one individual, and that, for this reason, no very uniform system is adopted in breeding and rearing them. A stallion of two years old may be put to mares, though it is better not to employ such as are below the age of three years. Mares are seldom allowed to bring their first foal till they are about four years old, and the far greater number are not employed as breeders, till they are several years older. They are covered in the months of May and June, because, as the period of gestation with mares is about eleven months, it is seldom advisable to have foals earlier than the middle of April, in the northern climate of Scotland. But if mares are intended to bring a foal every year, they should be covered from the ninth to the eleventh day after foaling, and the horse again brought to them, nine or eighteen days afterwards. A number of stallions, chiefly from the western counties, travel over the country, and are shown at the different weekly markets

in the month of May. The charge for covering varies according to the character of the horse, from 15s. to 21s. and upwards, with half a crown to the groom; and it is a common practice to agree for a lower rate, if the mare does not prove in foal; sometimes nothing more is paid in that case, than the allowance to the groom.

3. The mares are worked in summer as usual, and more moderately in winter, till near the time of foaling, when they should be turned to grass. It is both inconvenient and hurtful to have the mare and foal confined in a stall upon dry food. When grass has not risen sufficiently, they should be allowed to range over some inclosure near the farm-offices, through a part of the day, and be kept in a shed in the night. Such a shed, if contiguous to their pastures, is a great convenience even after grass has become abundant, as the weather is often cold and rigorous during the month of May. When the foal is a few weeks old, the mare is again put to light work, and it is weaned, according to its age, in September or October, after having sucked for about six months.

Breeding mares are evidently unable to endure the fatigue of constant labour, for some months before and after they drop their foals; and though foals have been sometimes reared on cow milk, the practice is neither common nor advantageous. The greater number of horses are therefore bred in those situations, where a small portion of arable land is attached to farms chiefly occupied with cattle or sheep; or where the farms are so small, as not to afford full and constant employment to the horses, which must nevertheless be kept for the labour of particular seasons. In similar situations it is also found profitable to perform the easy and occasional labour required, by young horses from two to five years old. Thus, the farmers of Ayrshire, and the other western counties, who generally crop one-fourth, or at most one-third of their land, and occupy the rest with a dairy stock, purchase young horses at the fairs of Lanark and Carn-

wath already mentioned, work them at the harrows in the following spring when below two years old, put them to the plough next winter at the age of two years and a half, and continue to work them gently till they are five years old, when they are sold again at the Rutherglen and Glasgow markets, at a great advance of price, to dealers and farmers from the south-eastern counties. A considerable number of horses, however, are now bred in the Lothians, Berwickshire and Roxburghshire, the very high prices of late having rendered it profitable to breed them, even upon very good arable land. But many farmers of these counties, instead of breeding, still prefer purchasing two and a half, or three and a half year-old colts at the markets in the west country, or at Newcastle fair in the month of October. They buy in a certain number yearly, and sell an equal number of their work-horses before they are so old as to lose much of their value, so that their stock is kept up without any other loss than such as arises from accidents; and the greater price that is often received for the horses they sell, is sometimes sufficient to cover any such loss.

4. During the first winter, foals are fed on hay with a little corn, but should not be constantly confined to the stable; for even when there is nothing to be got on the fields, it is much in their favour to be allowed exercise out of doors. A considerable proportion of succulent food, such as potatoes, carrots, and Swedish turnips, (oil-cake has been recommended), should be given them through the first winter; and bean and peas-meal has been advantageously substituted for oats, which, if allowed in a considerable quantity, are injurious to the thriving of the young animal, from their heating and astringent nature. Their pasture, during the following summer, depends upon the circumstances of the farms on which they are reared. In the second winter they are fed in much the same manner as in the first, except that straw may be given for some months instead of hay; and in the third winter they have a greater allowance of corn, as

they are frequently worked at the harrows in the ensuing spring, when about three years old. Next summer they are sometimes put to the plough for a month or two, and then turned to grass; and after harvest, when rising four years old, they are usually worked at the plough, and fed in the same manner as older horses. When the soil is a stiff clay, however, horses cannot stand constant labour till they are a year older.

5. It is not a common practice to subject young horses of this kind to any regular course of training, though this is sometimes done with much advantage. They are made familiar with their keeper as soon as they are weaned, led about in a halter, rubbed down in the stable, and treated with gentleness; and before being put to work they are placed under the charge of a steady careful servant, who very soon learns them to drag a harrow alongside of an older horse, and afterwards to take their share of the labour at the plough, and in all the other work on the farm.

SECT. II.

OF THE LABOUR PERFORMED BY HORSES, AND THE EXPENCE OF THEIR MAINTENANCE.

BEFORE the introduction of cultivated grasses, and summer fallow, the labour performed by farm-horses in Scotland, was irregular, inefficient, and comparatively unprofitable; their food was scanty and of indifferent quality; and their general management without method or system. For two or three months in spring their work was sufficiently constant, and even severe; but after the *bear-seed* was finished, they were turned to bare outfield pastures, as is still the practice

in some of the Highland counties, or tethered on the patches of ley which were intermixed with the land in tillage, or barely supported on thistles and other weeds, which the miserable husbandry of those days supplied in great abundance. During summer they were occasionally employed in carrying home peats and turfs for fuel, and afterwards the coarse bog-hay, which was the only kind of hay then known; and the labours of the season terminated with harvesting the crop. From that time, till the plough was set a-going again in spring, the horses, like their owners, indulged themselves, with few interruptions, in the luxury of idleness and poverty. In this state of husbandry oxen bore a large share of the labour of almost every farm; cattle were to be reared at any rate, and could not be fattened in those times till they had reached an advanced age; they could perform, in the interim, a certain quantity of labour without corn; and in case of accidents, the loss was not nearly so great upon oxen as upon horses.

I. It would occupy too much room, to describe the gradual changes which an improved system of cultivation introduced into the labours of agriculture, from the old arrangement of outfield and infield, till the establishment of alternate and convertible husbandry in the south-eastern counties. The several stages of the progress are still to be seen both in the western and northern districts. It will be sufficient in this place to mention generally the labour performed by horses throughout the year, according as the soil is adapted to the growth of turnips, or requires the periodical intervention of a summer-fallow.

1. The several rotations of crops best adapted to turnip soils have been fully described in the chapter on arable land; the most common one is that in which grass, (clover and ryegrass), and turnips, are taken alternately with wheat, oats, and barley,—the land being sown with grass seeds, with the crop immediately following turnips, and the grass cut for hay

or for soiling, or pastured for one or more years. Of 400 acres of land under this course, there will thus be every year 200 acres in corn crops and 100 in turnips, which require the labour of horses to be applied in the following order:— As soon as the crop is secured in the stack-yard, the ploughs are set to work on the land intended for turnips next summer, which it is desirable to have all finished by the end of November. But in the meantime some of the horses are employed in raising and carting the potatoe crop, carrying turnips to the fold-yard, and in threshing and carrying to market a part of the corn crop. During the months of December and January the grass lands, and the turnip land as fast as it is cleared, are ploughed for wheat and oats; in frosty weather, the dung is carted from the fold-yards to the next summer's turnip-fields, and turnips must be brought home, and the crop threshed and carried to market, as in the former period. The labour at threshing is indeed inconsiderable, unless the machine be worked by horses, in which case it forms a very serious addition to the ordinary labour of a farm. These several operations, and a variety of incidental jobs, give full employment from harvest to seed-time, which, when wheat is sown in spring, begins in the month of February, if the weather will permit. This important season is seldom over till the middle of April, and frequently continues during a part of May, when barley is sown after the latest of the turnip crop; while several other kinds of work must be attended to, such as carrying small stones off the hay field, and smoothing it with the roller for the scythe, filling drains, &c. In the latter end of April or beginning of May, potatoes must be planted, and Swedish turnips sown as soon afterwards as possible; both of them always requiring one spring ploughing, but oftener two; root-weeds must be collected after repeated harrowings, the land thrown into drills or ridgelets, the intervals dunged, and the ridgelets reversed. During the month of June the rest of the turnips must be all sown, after the same series of operations. In July and August, the remainder of the crop is usually sent to market, the turnips must be horse-

hoed repeatedly, lime and coals brought home, in several situations, particularly in the counties of Berwick and Roxburgh, from a great distance, often above 20 miles; the hay carried to the stack-yard; and, if wheat is sown in autumn on the clover stubbles, it is often found advantageous to give the land two or more ploughings, or a *rag-fallow*, as it is called. The month of September is fully occupied in carrying the crop, and, on very good soils, in sowing wheat after clovers. The same rotation of labour again begins, and every day throughout the year, in which men and horses can work without, has its share of the labours of the season.

2. With regard to clay soils, the greater part of this statement is also applicable to them, the chief points of difference being the culture of the land for beans at the season when spring wheat is sown in the former case, and that, instead of turnips, a fourth, sixth, or eighth part of the arable land is under fallow, and seeded with wheat in autumn. The turnip-land farmer may be said to be matched against time only, for he is less exposed to obstructions from the vicissitudes of the weather; but the clay-land farmer, besides being equally urged in point of time, particularly in sowing his beans in spring, and wheat after fallow and beans in autumn, is always in danger of seeing his greatest exertions and best conducted operations defeated, under a climate so variable as that of Scotland.

On both kinds of soil there is often a necessity for extraordinary exertions at particular seasons, of which it may suffice to give an instance in the case of turnip-sowing.—The land must be ploughed three times at an average, even though it has been some time under regular rotations, and will often require one or two ploughings more. All of these except the first must be given in April, May, and part of June. After every spring ploughing, the brake, harrows, and roller must be employed, more or less according to the condition of the land; whatever that may be, the harrows must go over it seldom fewer than twelve times after the diffe-

rent ploughings. When sufficiently pulverized, and all the root-weeds repeatedly gathered, and burnt or removed, the land must be formed into drills of from 28 to 30 inches wide, dung must be carted on, and immediately spread in the hollow between every two ridgelets, which are then split open or reversed to cover the dung; and the new-formed ridgelets above the dung must be sown so speedily, that the plough should never be half a dozen of ridgelets before the drill-barrow. A great deal has been said of the expedition of the Norfolk farmers at this season; and it may therefore be allowable to add, that upon the light soils of Roxburghshire it is quite common, in the months of May and June, for a pair of horses to give a clean ploughing, with a furrow nine inches wide, to one acre and a half daily; and to form the ridges from 28 to 30 inches wide, on double that extent,—not for a few days, but during the whole of these two months, and without any change of horses. In some instances, a man and a pair of horses have continued for a week or two to plough two acres a-day, and ridge four; but this exertion was certainly too severe.

II. The number of acres that may be cultivated by one pair of horses, must depend upon the course of crops which the nature of the soil prescribes as the most advantageous; upon the situation of the farm with regard to markets, manure, and fuel; and also upon the circumstance of a threshing-mill being worked by horses, or by some other power. It would lead to too minute and tedious a discussion, to attempt calculations applicable to these different and somewhat indefinite circumstances; it may be sufficient to state what is considered a fair average on farms under a regular course of management.

1. On clay lands, cultivated according to a six years' course of, 1. Summer-fallow; 2. Wheat; 3. Clover and rye-grass; 4. Oats; 5. Beans; and, 6. Wheat; 40 Scotch, or a little more than 50 English acres, may be equal to the labour of

one pair of horses. On very stiff clays they seldom do so much. For every pair of horses in this rotation, there are

In wheat	-	-	16 $\frac{2}{3}$ acres.
In oats	-	-	8 $\frac{1}{3}$
In beans	-	-	8 $\frac{1}{3}$
In clover and rye-grass	-	-	8 $\frac{1}{3}$
In summer fallow	-	-	8 $\frac{1}{3}$
			—
			50

but the land actually cultivated by the plough in any one year is only 41 $\frac{2}{3}$ acres, the 8 $\frac{1}{3}$ in grass having been sown with the wheat after fallow, and requiring only that any small stones should be removed, that it be rolled for the scythe, and the crop itself carted home; and even this labour is altogether saved upon that part of the division in clover and rye-grass, which is generally pastured. In the Carse of Gowrie, every 40 English acres require a pair of horses, and in East Lothian a pair of horses are considered equal by some to 52 acres, and by others to 60 acres, kept under this rotation, 43 $\frac{2}{3}$ acres being in crop and fallow by the former calculation, and 50 acres by the latter.

2. Of turnip soils, sixty acres may be kept in cultivation by one pair of horses, under a rotation of 1. Turnips; 2. Wheat, barley, or oats; 3. Clover and rye-grass; 4. Wheat or oats. In this rotation for every two horses there are

In turnips,	-	-	15 acres.
In wheat, barley or oats,			30
In clover and rye-grass,	-	-	15
			—
			60

the land ploughed every year being 45 acres. There are many instances where, with a little assistance from supernumeraries in the turnip season, no less than 80 acres are kept under this rotation by one pair of horses, of which 40 are under grain crops, and 20 under potatoes, turnips, and a small proportion of summer fallow. But this is certainly

above the average, and so much labour can only be performed in a sufficient manner, and at the proper season when circumstances are peculiarly favourable. Most large farms contain a variety of soils, at least there are many which consist chiefly of a clay soil, that include a portion of dry land suited to turnips, on which the ploughs may be employed when the other parts of the farm are too wet for tillage. On these farms, 50 acres, for every pair of horses, may be in grain crops, turnips and fallow, after the land has been for some years under regular management *.

III. The expence of this labour, in so far as regards the horses alone, (that is, exclusive of the wages of the ploughman, and the tear and wear of implements, but including the expence of their harness and shoeing), varies considerably in different situations, even when the same number of acres is cultivated by each pair of horses. The various articles of this expence may be classed under three heads : 1. The interest of their price, with an annuity sufficient to cover losses by decline in value, and by accidents ; 2. The value of their food ; and, 3. The expence of harness and shoeing.

§ 1. With regard to the price of horses, it is so different, according to the form and size of the animal, and the demand in different seasons, that no particular sum can be stated that will apply generally to every situation, even though the same extent of work is performed, nor to the same situation at intervals of a few years. Strong clays require heavier horses than light soils ; and where the surface is hilly, or a farm situated at a distance from markets, manure and fuel, a greater degree of activity is necessarily required. On land of the former description, fifty pounds may be a fair average, and

* For various statements on this head, see Sir J. Sinclair's Husbandry of Scotland, vol. i. p. 139, and the following chapter of this work, on Rural Economy.

forty pounds on the latter, the medium of which, forty-five pounds, may probably be assumed, with sufficient accuracy, as the price of horses capable of performing the labour already mentioned. The interest of the purchase money of a pair of horses is thus four pounds ten shillings yearly.

The annual decline in value is a matter of considerable uncertainty. If horses are worked for twelve or fifteen years, their value at the end of that period is little more than the price of their skin. But they are very seldom able to undergo the fatigue of so much labour as has been assigned them for such a length of time, seldom longer perhaps than from six to eight years, when they are ten or twelve years of age. After that they may be either sold at a greatly reduced price, or reserved as supernumeraries for giving assistance to the regular teams at particular seasons, supplying the place of such as may be laid idle for a few days by indisposition and accidents, and performing occasional work, such as carting clover and turnips, clearing the clover field of stones, filling drains, &c. If the whole period of a horse's labour be fifteen years, that of the first six may perhaps be equal in value to that of the remaining nine; a horse of ten years old, after working six years, may therefore be considered of half his original value, or L. 22, 10s., the same sum being lost upon his price every six years, or L. 3, 15s., and for a pair of horses L. 7, 10s., *per annum*.

Besides these annual charges against horses, there is a third one for insurance against accidents and diseases. It has been stated, that one horse in twenty-seven dies every year*; but this loss, it would appear, is calculated upon horses kept to a great age, and worked for fifteen years, so that the mortality must be ascribed in part to old age, and not altogether to diseases and accidents. This, however, is a much lower estimate than the experience of many farmers

* West-Lothian Report, p. 297.

will justify, if horses are regularly worked throughout the year in the manner already mentioned; perhaps a loss of one in twenty-five may not be far from the truth, which will constitute a charge of 4 *per cent.* on L. 90, the price of a pair of horses, or L. 3, 12s. yearly.

These several charges against a pair of horses may therefore be stated as under:

Interest of purchase money,	L. 4	10	0
Annual decline in value,	7	10	0
Insurance, - - -	3	12	0
	<hr/>		
	L. 15	12	0

which is at the rate of L. 7, 16s. *per* horse, or 6s. more than has been charged on these accounts, without any statement of particulars, by a very intelligent farmer, in a recent publication*.

It must, however, be noticed, that this annual charge is only applicable to horses that perform the labour that has been stated. The farmers of the west of Scotland gain considerably upon the price of their horses, after having worked them very moderately for two or three years; and several farmers, even in the south-eastern counties, who sell their horses when about eight years old, frequently obtain such prices as replace their capital, with interest, and all other charges. But the demand for horses of that age depends upon local circumstances, and can never be so extensive as materially to affect calculations intended to apply generally to all cultivated districts.

§ 2. The next head of expence is their food. For about four months in summer horses are fed on pastures, or on clover and rye-grass, and tares, cut green and brought home to the stable or fold-yard. The latter method is by far the most economical and advantageous, and it is very generally adopted in all the best cultivated counties. For other eight

* See Sir John Sinclair's Husbandry of Scotland, vol. i. p. 135.

months they are kept on the straw of oats, beans and peas, and on clover and rye-grass hay. As soon as the grass fails towards the end of autumn, they have hay for a few weeks; and when the days grow so short as to allow of no more than from six to eight hours' work, they are very generally fed with different kinds of straw, according to the circumstances of the farm; in the month of March they are again put to hay till the grass is ready to be cut. Throughout all the year they are allowed more or less corn when constantly worked; and during the time they are on dry fodder, particularly when on straw, they have potatoes, yams, or Swedish turnips, once a-day; sometimes boiled barley or carrots. A portion of some of these roots is of great importance to the health of horses, when succulent herbage is first exchanged for hay at the end of harvest; and it is no less so towards the latter end of spring, when hay has become sapless, and the labour is severe. At these two periods, therefore, it is the practice of all careful managers, to give an ample allowance of some of these roots, even though they should be withheld for a few weeks during the intermediate period.

The quantity of these different articles of food must depend on the size of the horses and the labour they perform; and their value, upon the prices of different seasons, and in every season, on the situation of the farm in respect to markets, particularly for hay and roots, which bring a very different price near large towns, and at a few miles' distance. It is for these reasons, that the yearly expence of a horse's maintenance has been estimated at almost every sum from L. 15 to L. 40 *. But it is only necessary to attend to the expence of feeding horses, that are capable of performing the labour that has been already stated. Such horses are fed with oats, (sometimes with beans), three times a-day for about eight months, and twice a-day for other four when at grass; and at the rate of eight feeds *per* bushel, each horse will eat 15 quarters

* Husbandry of Scotland, vol. i, p. 193.

of oats, or 20 bolls Linlithgow measure in the year. When on hay, he will require about 1 stone of 22 lbs. avoirdupois, daily, and 5 lbs. more if he does not get roots. One English acre of clover and rye-grass, and tares, may be necessary for four months' soiling, and a quarter of an acre of potatoes, yams, or Swedish turnips, will be required for each horse during the eight months they are fed with hay or straw. The use of these roots may admit of a small diminution of the quantity of corn in the winter months, or a part of it may be, as it almost always is, of an inferior quality; but in many cases no such deduction is made, and the latter circumstance has been attended to in stating the price of the oats. The expence of feeding a horse throughout the year, may therefore be estimated as follows:

Oats, 15 quarters at 25 s.	-	-	L. 18	15	0
Soiling, 1 acre of clover and rye-grass, and tares,	7	10	0		
Hay part of October and November,—March,					
April and May, 125 stones ($1\frac{1}{4}$ ton) at 10d.	-	5	4	2	
Straw for other four months, half the price of					
hay,	-	-	2	12	1
Potatoes, yams, or Swedish turnips, $\frac{1}{4}$ acre,			2	10	0
			L. 36	11	3

Supposing the land of a medium quality, the extent required for a horse's maintenance may be about five acres; that is for oats three acres, soiling one, and one more for hay and roots. On rich soils, four acres will be sufficient; but on poor soils, and wherever the horses are kept out on pasture, the produce of six acres and a half, or seven acres, will be consumed by one horse, fed and worked in the manner already mentioned. The straw of about two acres must be allowed for fodder and litter, the latter of which has not been charged because at a distance from towns, what is allowed for litter must at any rate be converted into dung. If 60 acres should therefore be assumed as the average extent of land, that may

be kept in cultivation, according to the rotations already mentioned, by two horses, the produce of 10 acres of this will be required for their maintenance; or a horse consumes the produce of one acre out of every six, which he cultivates, according to a four or six years' course, and something more than one acre out of every five which he ploughs annually.

§ 3. The third head of expence includes harness, shoeing, and farriery. The present prices of harness, of a medium quality, amount to about L. 6, 10 s., for each horse that may be either employed at the plough or single-horse cart. The several articles are, bridle, collar and *haines*, saddle and breeching, chains, back and belly-bands, corn-bags, stable collar, brush and combs. This harness may last about four years, so that the yearly expence for each horse will be L. 1 : 12 : 6, to which L. 1 : 7 : 6 must be added for shoeing and farriery, amounting together to L. 3 for each horse *per annum*.

The annual expence of a pair of horses, capable of performing the labour that has been assigned them, will therefore consist of the following sums:

1. Interest of purchase money, decline in value, and instance,	-	-	-	L. 15	12	0
2. Value of food,	-	-	-	73	2	6
3. Harness, shoeing and farriery,	-			6	0	0
				<hr/>		
				L. 94	14	6 *

Which, upon 60 acres of turnip land, under a four years' rotation, is L. 1 : 11 : 6 $\frac{2}{8}$ for every acre; upon the land actually cultivated in any one year, being 30 acres of corn and of potatoes and turnips, L. 2 : 2 : 1 $\frac{2}{8}$, and upon the corn

Some of these articles would have been varied, but only in a trifling degree, and been thought necessary to calculate according to the principles of annuities instead of dividing the total sums by the numbers of years, at the end of which they are lost or expended.

land alone, L. 3 : 3 : 1 $\frac{4}{5}$. On 50 acres of clay land, under a six years' course, the expence is at the rate of L. 1 : 17 : 10 $\frac{1}{2}$,—exclusive of the grass division, nearly L. 2 : 5 : 6; and upon the land in crops of wheat, beans, oats and barley, being 33 $\frac{1}{2}$ acres, it is about L. 2. 17 s. *per acre*. The daily expence, all the year over, is 5s. 2 $\frac{1}{2}$ d. and when Sundays, and interruptions from holidays, and bad weather, at the rate of half a-day in the week, are deducted, the daily expence on 287 working days amounts to 6s. 7 d., for the work of horses alone. When the wages of the ploughman, the expence of supporting ploughs, carts, and other implements, taxes on horses, road-money, and incidental charges in delivering grain, and bringing home lime and fuel, are added to the above annual charges, each of these sums will be advanced at least 50 *per cent*. The average expence of cultivation, for every acre of grain in these rotations, cannot therefore be less than L. 4, 10 s.; and it seems not unreasonable to charge the whole of this against the grain crops; for on an average of clay and turnip soils, under the rotations that have been mentioned, the value of the clovers and turnips will be required to meet other charges, such as, for seeds, lime, drains, fences, &c., besides the labour of hay-making and turnip-hoeing. The turnips and clovers of a four years' course, may be worth more; but the clover of a six years' course on clays, will be inadequate. To this L. 4, 10 s., must be added, L. 2 for seed and harvest work, so that L. 6, 10 s. may probably be very near the sum which every English acre of corn and pulse costs the farmer; and it is only from the surplus, that the rent of the whole land, taxes, and the profits of trade, can be defrayed.—But a more particular account of the charges against tillage rotations, belongs to a different department of this Report.

IV. The general management of farm-horses in Scotland may be understood from what has been stated. Each ploughman has the charge of a pair, which he works regularly, whenever the weather will permit, nine hours a-day on strong

clays, and ten hours on light soils, in spring and summer; and from six to eight hours a-day in winter. When harvesting the crop, no attention is paid to hours; and in seed-time, and for several weeks, while the land is in preparation for turnips, there is often no other limit to exertion than the ability of the horses. One man never works two pair of horses successively, as in some parts of England. The common hours of labour, when the days are sufficiently long, are from six in the morning to six in the evening; two or three hours, from eleven or twelve to two, being allowed for feeding and rest. They are fed with oats before they go to work in the morning, a second time before the afternoon journey, and a third time in the evening, and have roots either between journeys, or when they return from the second one. In winter the horses are not unyoked at mid-day. When they are at work from light to light, or from about eight in the morning till four in the afternoon, they are allowed a little corn on the field while the ploughman eats his lunch, but no corn is given, if they work only six hours, which is the practice in several places, though certainly an unprofitable one. Every hour's work of a man and a pair of horses does not cost a farmer less than one shilling; two hours, or at least an hour and a half's work, is therefore much more valuable, after deducting the price of the corn given at mid-day, than the labour of the man alone at any occasional employment. The horses are usually kept in stables, with single stalls, in winter and spring, though sometimes in sheds and fold-yards; and frequently in the latter during summer, while they are fed on clovers or tares. They are carefully cleaned with the curry-comb and brush in the morning—in winter by candle light, rubbed down when they return from the field, and again dressed at eight o'clock in the evening, when they have fodder and litter for the night. Upon the stable loft, or some other place near the stable, one of the ploughmen sleeps, that he may be at hand in case of any disturbance among the horses through the night.

According to the plan of the County Reports, it would now be necessary to institute a comparison between the labour performed by horses and by oxen. But in none of these reports are there any correct data upon which to found such comparison. A few oxen are indeed employed in ploughing in several of the eastern counties to the north of the Frith of Forth, but the number has uniformly diminished in proportion to the progress of improvement, and the establishment of the most approved rotations of convertible husbandry. The labours of agriculture are not now, as in former times, irregular and desultory; it is no longer necessary to keep oxen to an advanced age before they can be fattened, as cultivated grasses and turnips enable the farmer to bring them to greater perfection at three, or at most at four years old, than by the old management at six or eight. The introduction of the Leicester sheep, as a suitable stock for the pastures of arable land, has in a considerable degree superseded the breeding of cattle in the south-eastern counties, which can be always supplied in abundance from the Highlands; the cattle of which, though too small for labour, are extremely well adapted for fattening on their pastures, and produce beef of a quality greatly superior to that of large oxen.

Cattle so strong as to be fit for labour, must evidently be reared on good land. The north-eastern counties at one time furnished a considerable number to the farmers of the southern counties; but the farmers of the former counties, would require a very high price to indemnify them, at the present time, for affording such a supply; and the price would of necessity be greatly enhanced by the competition of the grazier and butcher on the one hand, and of the tillage farmer on the other. If oxen were generally worked, it would therefore be necessary to employ a considerable proportion of the best arable land for breeding and rearing them, and for their maintenance afterwards when put to work,—probably double the extent of land at present required for providing food for horses must be appropriated to these purposes.

The price of oxen for labour, would then advance as much at least, in proportion, as that of horses has done. This is a circumstance not the less true and important, that it has not hitherto been duly attended to, in the course of the numerous debates on this subject. It has been taken for granted, that an ox fit for work, should always continue to be of no more value to the ploughman than to the grazier, and various calculations have been made to show how much he advances in value for three or four years. A greater number of cattle might no doubt be reared to meet this double competition for beef and labour; but in the same proportion, a smaller quantity of grain, of mutton, and of wool would be produced, and a smaller number of horses would be reared for the numerous purposes of society, for which oxen have never been considered adapted. The consequence of all this will not be doubted by those, who are disposed to view the question dispassionately in all its bearings. If two acres of arable land be required, to produce that quantity of labour, for which at present one is sufficient—no matter whether the land be in grass or oats—the loss to the community at large is demonstrable; and the ultimate addition to the stock of beef, by an increase of four or five stones yearly, on the weight of the worked oxen, would go a very short way in indemnifying the public for the necessary deficiency, and consequent high price of other articles not less indispensable than beef,—or than oats, the consumption of which by horses has been the subject of so much idle declamation.

Oxen have accordingly been so generally dismissed, that the reporter for Berwickshire, during fifteen years' residence there, never saw an ox employed on the road, and not exceeding three ploughs drawn by oxen at different places, either in Berwickshire, or in the neighbouring counties of England and Scotland. "In this county," (says the reporter for East Lothian), "an ox has rarely been seen in a plough or a cart, for many years; and all that has been done by reasoning or experiment in other quarters, to bring

them into fashion, cannot convince any of our farmers, that the change would be for their interest *." Even in the north-eastern counties, the same sentiments are become very general. In Aberdeenshire, "the worked oxen are not one-fifth part of the number that was kept before 1782, nor one-tenth of the number that was kept fifty years ago †." Such have been the consequences of the extension of improved husbandry, which even the impolitic tax on farm-horses has failed to withstand.

To account for the general preference given to horses in Scotland, it has been said, that "the change from the kind of ox-teams formerly in use, to teams of two horses, was a manifest, and great improvement. At that time, not fewer than two oxen and two horses were yoked in one team, and two oxen besides were kept to relieve alternately the two in the draught. It was easy to see, if two horses performed as much work as four oxen and two horses, that the use of the latter team should be given up, and that of the former introduced ‡." But if even four oxen are equal for farm labour to two horses, (and it has been lately alleged that three oxen will perform as much work as two horses), why not lay aside the horses, and retain the oxen?

The following reasons, among others, may be assigned for the exclusion of oxen from farms, under the rotations that have been mentioned.

1. The first and most important objection to the employment of oxen is, that they are incapable of performing all sorts of farm-labour. There is not, with the exception of Lord Kames, any writer of reputation on husbandry, whose sentiments are not in unison with the general opinion of actual farmers on this point. Some, indeed, allege, that a part of the labour may be performed by oxen, with some advantage, in

* East-Lothian Report, p. 189.

† Aberdeenshire Report, p. 491.

‡ West-Lothian Report, App. p. 304.

particular situations, but none of them contend for the total dismissal of horses.

It is allowed on all hands, that they are unfit for distant carriages, and the actual practice almost confines their labour to the plough. They are less fit than horses even for harrowing, from the slowness of their motion. In frosty weather, which often continues for two months and more, at different periods of the winter, while the horses are fully employed in home and distant carriages, the oxen are idle in the straw-yard*. On turnip-land farms, where there is no summer-fallow, there is seldom any ploughing from July to October; and the horse-hoeing of the turnip crop, in which oxen may be employed, occupies but a very inconsiderable portion of that interval. But this is the period when very great exertions must be made by horses, and so much the greater in proportion as the whole of the labour falls upon one branch of the labouring stock, instead of being equally divided among the whole teams, as is the case where no oxen are worked. From this it follows, that a greater number of teams, and also of ploughmen must be kept, than if the whole labour was performed by horses. Instead of six pair of horses, it would be necessary, if one-third of the ploughing and harrowing was done by oxen, to keep five pair of horses, and two teams of oxen. On a farm situated near markets and manure, the number of distant carriages is indeed greatly diminished; but in such places, potatoes, turnips, grass, and hay, are so much more valuable than oats, that it is acknowledged the employment of oxen near towns would be unprofitable. It may be thought that labour may be so divided, as to give constant employment to oxen in that sort of work for which they are best adapted: they may plough, it has been said, while the horses are bringing home

* West-Lothian Report, App. p. 209.

lime. But a little attention to the routine of labour that has been described, must convince every person acquainted with the subject, that such a division of labour is impracticable, on the generality of farms. The different branches of labour must be performed, each of them at the proper season. Ploughing does not last all the year, especially upon dry-land farms; and upon clays which do not grow turnips, and where oxen must be fed on hay, it is admitted that they are unable to do so much work; "one ox fed with turnips and straw will do more work than two oxen fed with the best hay *," and the hay is much more expensive †.

2. A supply of suitable oxen could not be obtained, unless a great many were reared upon land that can be more profitably employed in alternate rotations of corn and green crops. This may be no objection in those districts of the island, where a great deal of the best arable land is retained in old grass, but, according to the most approved management of the comparatively small extent of arable land in Scotland, it is a very serious one. An ox, of the short-horned breed, at the age of three years, has been estimated to consume a quantity of produce worth L. 20 : 17 : 6, and to be then of the value of L. 27 . 12 : 6 to the butcher ‡. If there was a demand for the labour of such oxen, the price of a lean ox would probably be as high as the last sum, by which the breeder indeed might be sufficiently reimbursed; but the greater extent of land required for the maintenance of oxen, when put to labour, combined with this advance price, would certainly render them very expensive labourers either to the breeder or the purchaser; and, if bred in sufficient numbers by the person who employs them, as might often be necessary, would oblige him to change that arrangement of his crops which he has hitherto found most profitable.

* Husbandry of Scotland, vol. i, p. 121.

† West-Lothian Report, p. 305.

‡ See Mr Mason's letter to Sir John Sinclair. Farmer's Magazine, NO. 57 February 1814.

8. There is this important difference between horses and oxen, that the former are capable of great exertions, so indispensable in a late spring, and in the variable weather of a protracted harvest, as well as during the sowing of wheat after fallow and beans. The labour required on turnip-farms in the months of May and June has been already noticed; and it may be added, that if turnip sowing cannot be completed by the first week in July, the loss is considerable, what is sown afterwards being of very little value, seldom half the crop that the very same kind of land produces, with only an equal quantity of labour and manure, when sown a week or ten days earlier. A horse works according as he is fed, and very soon recovers from the fatigue of a few weeks' extra exertion; an ox is utterly incapable of such exertion, however he may be fed, and if pushed beyond his ordinary pace, is rendered useless for a long time afterwards. The saving of time, even a single week, may secure against a loss so great, that a sum equal to the expences of all the teams on a farm, for a whole year, would not reimburse it.

These considerations are sufficient to account for the preference given to the employment of horses, and, upon good arable land, under the rotations that have been mentioned, for the total exclusion of oxen. There are, however, many farms, of which a part only can be cultivated, according to a four or six years' course; these contain a considerable proportion of land in pasture, on which cattle and other kinds of live-stock are either reared or fattened, or both, according to its quality. There is a number of farms of this description, even in the best cultivated counties, where it is found profitable to breed cattle on such parts as produce coarse, bulky herbage,—though the extent of land of this kind is daily diminishing. Besides, farms are sometimes so large, and of such different qualities of soil, that ploughing for grain, for turnip, and for fallow, is continued in regular succession almost all the year, unless when interrupted by frost. When these two favourable circumstances to the employment of

oxen,—land suitable for rearing them, and a constant opportunity of working them at the plough,—are conjoined, a few oxen may certainly be employed with advantage, so long only as the limited demand does not raise them above the grazier's price,—not so much because their labour is actually cheaper than that of horses, as that, from the steadiness of their draught, there is less danger of accidents in breaking up old tough swards, and because, from the quality of the land on which they are reared, they cannot be brought to a state of profitable maturity at an early age. If, to these circumstances, is added their employment in a threshing-mill, the superior economy of a few teams of oxen is obvious, and seems to be considerable. Accordingly, in almost the only instance in the southern counties of Scotland, where the employment of oxen has been persisted in, all these favourable circumstances were combined *.

It has been alleged, that oxen might also be employed with advantage on small farms, and on such grazing farms as have but a small portion of arable land. But here it seems necessary that the labouring stock should be fit for every sort of work; and the practice of the western counties, in employing young horses in such situations, is in every respect preferable. The profit from working horses very moderately, for two or three years, and selling them when at their prime, is more than double what could be obtained by the use of oxen for the same period.

It was formerly observed, that there are no data in the county reports, from which the expence of the labour of horses and of oxen can be accurately compared; and for this obvious reason, that with one or two exceptions, the latter forms no part of the permanent labouring stock of the best cultivated counties. Besides, in no instance do they work

* See Sir John Sinclair's Husbandry of Scotland, vol. i, p. 120. and West Lothian Report, Appendix, p. 286.

the horses at all the operations of a farm. These two sorts of labourers cannot, therefore, be placed alongside of each other, and their respective qualifications subjected to a fair trial. The most common opinion, till very lately, was, that six oxen were required to perform the labour of two horses: then it was thought that four oxen would be sufficient, two of them worked at a time, for half the day; and it is now asserted, that three oxen, each of them changed in rotation, and thus working only four days a-week, are capable of performing the labour of a pair of horses. In so far as relates to ploughing, (for that is the only sort of work, with which any comparison has been made), it will not be disreputable to oxen, to place four of them against two horses, according to the practice of the north-eastern counties; and when the different extent of land, that is required for rearing four oxen to the age of three years and a half, and two horses to the age of three years, is duly considered, and afterwards the produce consumed by both while at labour, it will be found, that should oxen be thought capable of every kind of work, instead of ploughing only, a much greater number of acres must be allotted to their maintenance.

At the age of three years and a half, each of the four oxen will have consumed the produce of nearly as much land as a horse of the same age. In so far as concerns labour, therefore, the one instrument may be said to be obtained at half the cost of the other.—During the period of labour too, a much greater extent of land is required for the maintenance of four oxen than of two horses: ten acres of land of a medium quality have been already assigned for the support of a pair of horses highly fed; and for four oxen, according to the statement in the Report for West Lothian, formerly referred to, there will be required four acres of turnips, and about seven and a half acres of grass; and in proportion to the allowance of hay, in the spring months, in the preceding estimate for horses, the oxen will require at least two acres

more for that article, amounting in all to $13\frac{1}{2}$ acres. If the oxen are idle for two months in the year, this is the same thing as if they had worked twelve months, and consumed the produce of $16\frac{1}{2}$ acres.

Let it, however, be admitted, that this extra consumption of produce, ought not to be all charged to the head of labour. For the three years that oxen are worked, they are said to add L. 6 each to their value when put to work, which is equivalent to 15 stones of beef at 8 s. and for the four oxen 60 stones during their three years' labour. In a former part of this chapter, it has been estimated, that an acre of good pasture, worth L. 4, should produce 15 stones of beef, so that four acres out of $48\frac{1}{2}$ acres, the produce of which is consumed during the three years' labour of four oxen, which are then six and a half years old, may be said to have been employed in producing beef, and $44\frac{1}{2}$ in producing labour, that is $14\frac{1}{2}$ more than horses would have required for their maintenance, while working three years; making a difference every year, in favour of a pair of horses, of nearly five acres; over and above the difference, in the number of acres required for the maintenance of horses and oxen till they are ready for labour.

With regard to the *value* of the crops consumed by horses and oxen, it does not appear that the difference is considerable, at least not in any degree equal to the difference in *quantity*. An acre of oats producing 40 bushels, and an acre of turnips, may be nearly of the same value; and the grass, whether cut or pastured, and hay, cannot be rated very differently *per acre*.

The much disputed question about the employment of oxen, is sufficiently decided, so far as regards the interest of cultivators, by almost universal experience. The preceding observations have been therefore chiefly confined to a general view of the question, in so far as the public interest may be supposed to be concerned; and fortunately on this, as on most other occasions, when no municipal regulations inter-

these two interests are identified. An ox reared on arable land, will in his third year add 80 stones to his weight, and may reach his most profitable weight at age, and in every case before he is a year older. He no doubt attain a greater weight at seven, especially if he has been poorly fed when young; but the food which he consumes after the age of four years, will produce a much greater addition to the weight of a younger animal, and be therefore much more profitably employed. Though he can both gain weight, and perform such labour as he is capable of at the same time, there can scarcely be less than a yearly produce of five acres lost on every team of four.

One half of this, which might be in wheat, barley or one-fourth in turnips, which, by a calculation in a former part of this chapter, may produce from 360 to 400 lbs. of beef *per* acre, and another fourth part in pasture, that would produce from 180 to 200 lbs. *per* acre, may be considered as the yearly loss upon every four working oxen, under the peculiar circumstances already mentioned.

If there is any truth in these statements, (for perfect accuracy is unattainable, for the reasons that have been assigned) the consequences of substituting oxen for horses in the arts of agriculture, must appear to be highly injurious, to the interest of individuals and of the public.

There are evidently three points of view in which the question must be considered, before the advantages and disadvantages of employing oxen to any extent can be duly estimated. The only principle upon which such a comparison can be founded, is not the present price of oxen and of their food, but the number of acres that must be employed in rearing them till they are fit for work, and in supporting them afterwards. Let it be supposed for a moment that four oxen are actually capable of performing every sort of labour, in the same time, equally well with two horses, a supposition, however, altogether inconsistent with experience. The first branch of the comparison will relate to the number

of acres required for the production of beef and labour combined : the *second*, for the production of beef alone ; and the *third*, for that of labour when performed by horses.

1. *Beef and labour.*

1. The first consideration is the number of acres required for the maintenance and fattening of four oxen kept to the age of seven years, put to work at three and a half, worked till six and a half, and then fattened.

Four oxen at three and a half years old for grass and turnips, four and a half acres each, or - 18

Ditto working till six and a half ditto, $18\frac{1}{2}$ acres for three years, - - - - - 40 $\frac{1}{2}$

Ditto turnips for fattening, - - - - - 3

Total, 61 $\frac{1}{2}$

Besides straw, for which no charge is made.

2. The weight of these oxen when fat, may be averaged, from considering the weight of oxen bred on good arable land, and fattened at three and four years old. At the former age, it has been stated in Mr Mason's letter, formerly quoted, that the average weight of the short-horned breed may be 65 stones ; it certainly will not therefore be too high to rate such oxen as are fit for work, at 60 stones, when four years old, to which must be added 15 stones gained during three years' work ; but allow the increase of weight to be 20 stones, each of these oxen weighing 80 stones at seven years' old, the beef produced from 61 $\frac{1}{2}$ acres is in all 320 stones, or 5.203 stones *per acre*.

2. *Beef.*

This number of acres is employed in producing beef and labour jointly. It is necessary to separate these two articles, and, in the first place, to ascertain what proportion of this land would give the above-mentioned weight of beef, if the cattle, instead of being worked, had been fattened at three or rather

at four years old, which is the most common age over all the arable districts of Scotland. Now, four oxen at three and a half years old, are supposed to have consumed the produce of 18 acres; to which add, as before, three acres for fattening, and the extent of land necessary for rearing and fattening four oxen of 60 stones each, is 21 acres, and the beef produced 240 stones, or 11.428 stones *per* acre. At this rate 28 acres would be required for producing 320 stones, which, when beef and labour are combined, demand for their production 61.5 acres, of which, therefore, 33.5 acres must be placed to the account of labour.

3. *Labour performed by horses.*

This mode of calculation is certainly extremely favourable to oxen: for at the age of three years and a half, allowing no more land for horses than for oxen, (as they may be worked before that age, and will pay for their food at least, at three years old), every two of the former will have then consumed the produce of nine acres, and, during their three years labour, that of 30 acres, or ten acres yearly, according to a preceding calculation. Hence there is a balance of five and a half acres on the side of the oxen. But the comparison must not stop here. The oxen are gone to the shambles, and their whole value has been accounted for. The horses are still in their prime, and ready, without an hour's training, to be matched against a succession of oxen for twelve years longer. Accordingly, against the labour of each of these four sets of oxen, must be placed the same number of acres, that is, in all, $33\frac{1}{2} \times 4 =$ - - - 134
For a pair of horses twelve years at 10 acres, - - - 120

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Deduct the loss on horses on a comparison with the first set of oxen, - - - - - $5\frac{1}{2}$

Balance in favour of horses, - - - $8\frac{1}{2}$

Besides the value of the old horse after 15 years' labour.

this place to notice a few of those disorders of which almost every farmer has some knowledge in his own experience.

Cholic or *Gripes* is a frequent cause of loss, to those farmers who feed their horses very high, and occasionally require extraordinary exertions. This distemper has been treated of under three different characters, namely, the flatulent, the bilious or inflammatory, and the dry cholic. The first of these may be occasioned by drinking too much cold water when a horse has been overheated; the second arises from an internal injury produced from overstrained exertion; and the third, which is very similar to the first, is sometimes occasioned by a too abundant allowance of oats, and other heating and astringent food. The flatulent cholic may be treated with success by bleeding in the neck veins, emptying the intestines with the hand and by means of glysters, and administering gruel of oil and salt, Geneva, and nitre. The horse should be well rubbed on the back and belly, with a hand moistened with oil, kept on his legs if possible, and induced to take moderate exercise. Opiates have also been given with good effect. In the inflammatory species of this distemper, a cure is probably more difficult; stimulating medicines must be improper, and only such are of a cooling and laxative nature should be given. If these do not effect a cure, a very strong decoction of Jesuit's bark has been recommended.

There are some horses much more liable to a cholic than others: every slight variation in their food and labour induces it. Sometimes they recover of themselves, as is almost always the case as soon as there is a discharge of fæces or urine. These frequent and apparently innoxious attacks, are apt to create a feeling of security, both in farmers and their servants, and the disorder at last almost always terminates fatally. As soon as a horse exhibits symptoms of a cholic, which are too well known to need any description, not a moment should be lost before the proper remedies are applied; and such horses as are frequently seized, should be disposed

of, as unsuitable to the purposes of their owner: whatever good properties they may possess, their constitution, or previous habits, render them ill adapted to endure the labour which he requires of them.

Horses are often afflicted with a *cold*, which, though not a dangerous disorder in itself, is frequently the cause of such as are the most virulent and mortal. Bleeding, laxative medicines and emollient glysters ought to be resorted to as soon as the complaint appears, for there is danger of an inflammation of the lungs and consumption, and by neglect a common cold may terminate in confirmed glanders.

Hard-worked horses, fed too abundantly with oats, are apt to swell in the heels, during winter, when they are long confined to the stable. Corn or fodder of a bad quality will produce the same effect. This is called the *grease*. If a remedy is not speedily applied, the swelling extends upwards, and matter begins to ooze from different parts of the heel; the animal falls off in condition; and when led from the stable in a morning, walks for a time with great difficulty. The legs should be well rubbed and washed with soap-suds and chamber-lee; and if the swelling still continues, poultices must be applied to reduce it, and promote a discharge. The best preventive is to give horses a proportion of potatoes, Swedish turnips, or boiled barley along with dry food; and the most effectual cure is, to keep them through the night in fold-yards, with sheds attached, under which they may take shelter at pleasure. Some farmers have long been in the practice, whenever there was any appearance of grease, of turning their horses out of the stable, after they were fed in the evening, taking off the stable door, and allowing them to go between it and the fold-yard; in both of which places, racks are filled with hay or straw, for their use during the night.

It were easy to enlarge this article to almost any size, by extracting from veterinary works, a description of the numerous diseases of horses, and of the modes of treatment; but this would be as improper as it is altogether unnecessary. It

piece, in some parts of Scotland, were destroyed like kittens as soon as they were brought forth, or given away to any person that choosed to be at the expence of rearing them. Even in years of ordinary abundance, when prices of grain and potatoes are moderate, it is a doubtful question whether they can be bred and fattened with much advantage, by those who have to purchase every article of their food.

For these reasons, swine hold only a subordinate rank among the agricultural live-stock of Scotland. They are now, however, to be found on almost every farm, and in several counties at almost every cottage. In several of the western counties, where potatoes are extensively cultivated, particularly in Dumfries-shire, and in the districts where dairy husbandry prevails, their numbers are considerable; and the money received for bacon exported to England, forms an important addition to the income of the inhabitants. From the eastern counties, great numbers of pigs are sent to Berwick, Aberdeen, and other places, from whence they are carried to the London market in the state of pickled pork. Almost every town and village in Scotland are regularly supplied with pork and bacon; and even in the northern counties, the prejudice against the flesh of swine has greatly subsided; and some of the herds, which they have been long in the practice of driving to the markets of the low country, are now retained at home, and profitably applied to the food of the inhabitants. At one distillery 2000 swine were fed annually*; and the numbers fed at cornmills and breweries add not a little to the emolument of their owners.

1. The *breeds* of swine in Scotland are not distinguished by any appropriate appellations. A few intelligent breeders of live-stock, have indeed bestowed a part of their attention on this species, and the best varieties of the English breeds have been introduced into different parts of Scotland. They are seldom, however, to be found in a pure state, having for

* Kinross Report.

the most part been intermixed with the native races, which in many districts have been greatly improved of late years. The most numerous race in the lowland counties were, and in several places still are, very unprofitable animals. They are of a white colour; have light narrow carcasses, with bristles standing up from nose to tail; long legs; and are very slow feeders even at an advanced age. In the Highlands and Hebrides, the breed, supposed by Dr Walker to be the aboriginal, is of "the smallest size, neither white nor yellow, but of a uniform grey colour, and shaggy, with long hair and bristles; they graze on the hills like sheep; their sole food is herbage and roots, and on these they live the whole year round, without shelter, and without receiving any other sustenance. In autumn, when they are in the best order, their meat is excellent, and without any artificial feeding; but when driven to the low country, they fatten readily, and rise to a considerable bulk*." In the Orkney Islands they are commonly of a dark red, or nearly black colour, and have long bristles, with a sort of coarse wool beneath them.

The kind of swine most generally approved of by corn farmers, is of a medium size, which, with little besides the run of the straw-yard, weigh from ten to twelve stones when about a year old. A larger size is preferred in the western counties, where they are more regularly fed with potatoes and the offals of the dairy, and their flesh is sent in hams and flitches to the English market. For pickled pork, a small size, not exceeding the weight of ten stones, and meat not too fat, find the readiest market in the south-eastern counties. Nearly the same shapes are desirable in swine as in other animals intended to be fattened.

2. The mode of *breeding*, the *food*, and the general *management* of swine, are all of them so much dependent on local circumstances, and are so much varied in consequence,

* Walker's Hebrides, vol. ii. p. 17.

that it is neither possible, nor would it be of any utility to describe the practice of different counties, or rather of almost every different individual. In some places there is a constant demand for pigs when newly weaned, and breeding is therefore the principal object; in others, those of six or eight months old, called *shots*, are more in demand. They are bought by farmers, who give them the run of the straw-yard in winter, and sell them moderately fat in spring; and in May, by such as feed through summer on the offals of the dairy. It is seldom that any one of these practices is exclusively persevered in by those who keep a considerable number; the same person who breeds, also sells young pig-shots, and fat swine, according to the demands of the market, and his own convenience.

The period of gestation with swine is sixteen weeks: the pigs are commonly weaned when six weeks old; soon after which the sow is again in season, so that two litters are usually farrowed within the year; sometimes, though very rarely, five litters in two years. It is of importance to attend to two things in breeding swine: They should not be allowed to farrow in winter, as young pigs are exceedingly tender, and can with difficulty be preserved in very cold weather; nor at a time when food is scarce, as is generally the case upon corn-farms in summer, if the stock of them is large. The months of February and August have been recommended as the best periods for parturition*. Twenty swine are estimated to bring at an average $7\frac{1}{2}$ pigs each for their first litter†; but the number varies much, and many young pigs are lost soon after their birth by the unkindness of their dam, and by casualties to which they are more exposed than most other young animals.

A sow in pigs should be separated from the herd some time before she is expected to farrow, carefully watched, and littered with a small quantity of dry short straw. To

* Henderson on Swine, p. 27.

† Ibid. p. 17.

Such straw is improper, both at the time of farrowing and a week or two afterwards, as the pigs are apt to tattle beneath it unperceived by the sow, who is in this case always in danger of smothering them when she lies down. A breeding sow should be well fed, particularly when nursing; and it is advantageous, early to accustom the pigs to feed from a trough, on milk or other liquid food, mixed with meal or bran. Such of the pigs of both sexes, as are not to be kept for breeding, are usually castrated or spayed when about a month old, and the whole may be weaned at the end of six or seven weeks. They should then be fed regularly, three times a-day, with meal and water a little warmed, until they are able to shift for themselves among the rest of the stock.

The food allowed, whether to growing or fattening swine, depends on the circumstances of their owners. The cottager's pig must be contented with the scanty offals of his kitchen, and of his dairy, consisting generally of a single cow: towards the end of autumn, a few potatoes are added, for the purpose of preparing it for slaughter, and perhaps a little meal is mixed with boiled potatoes for a week or two before. Such pigs, however, often thrive amazingly, make themselves moderately fat, and form a most valuable addition to the winter stores of their owners. In the south-eastern counties, the hinds or married ploughmen, are commonly allowed to keep a pig each, which they feed in this manner, and from which their families derive much benefit at very little expence.

On corn-farms, the chief, and not unfrequently the only dependence of swine, is on the straw-yards. The sweepings of the barn-floor, corn left upon the straw, and oats found among the dung of horses, with a share of the turnips and clover given to cattle, afford ample subsistence to swine, in proportion perhaps of one to every five or six acres under corn, clover, and turnips. The kitchen and dairy give some assistance to pigs newly weaned, and also to such as are soon to be slaughtered. A great many are killed for the London market when about a year old, that have never been fed at any expence that can be estimated. A few pigs, if of

a good breed, will always be moderately fat at that age with the run of the straw-yards, and their flesh is of an excellent quality.

It is unnecessary to mention the mode of feeding pigs at dairies, mills, distilleries, &c.; but when farmers find it profitable to keep large swine that cannot be fattened for bacon, as is the practice in some of the western counties, without a regular supply of food being served up to them, the practice is, to rear swine chiefly on raw potatoes and Swedish turnips, and to fatten them on these roots boiled or prepared by steam, with a mixture of oat, barley, or bean and peas meal. Their troughs should be often replenished with a small quantity of food at a time, and kept always clean; and their food changed occasionally, and seasoned with salt.—In none of the county reports, is there any calculation of the expence and produce of this management, nor of the weight of meat returned for any given consumption of food. In so far as concerns pigs fed on whey, reference may be made to a former part of this chapter. “If proper care is taken,” says Mr Henderson, “a feeding swine should not consume more than six Winchester bushels of oats made into meal. It ought to be shelled before it is ground, the same as for family use, but need not be sifted*.” The quantity of potatoes is not distinctly specified, nor the weight of the carcase. When potatoes and grain bring the average prices of late years, there is reason to doubt the advantages of this practice, except in those places, where the imperfect state of husbandry produces a greater supply of potatoes than can be disposed of for other purposes.

A farmer of great experience has stated, that “upon a tillage farm of 300 (Scotch) acres, whereof 200 are kept under the plough, it is reckoned, that a sum not less than L. 1000 Sterling, may be gained annually from keeping swine, when the management arranged in a systematic manner.”—“With the addition of one acre of broad clover, and one acre of

* Treatise on Swine, p. 26.

tares, for the summer and autumn months, and the like extent of ground, for turnips and yams, during the winter and spring months, the whole not exceeding L. 20 in value, the stock of swine that we are to recommend may be amply supported." Forty swine, the produce of two breeding sows, are to be reared and fattened every year, which, at so low a price as 50 s. each, would give the sum required; the breeding sows to be fed when three years' old, and a young one reared every year to supply the place of the oldest; four sows would thus be on hand at a time, which would produce more than forty pigs; but the surplus are to be sold as they are weaned. "We have," says the same writer, "for a number of years, kept a stock of swine in the way now recommended. They go at large in the court or yard belonging to the farm, and receive a feeding of offal grain in the morning, and of yams or turnips in the evening, and the meat fed in this way has constantly drawn the highest price." The clover and tares will keep the stock in a growing state towards the latter end of summer and during harvest, which are the most critical periods for carrying on a stock of swine, and milk and whey during these seasons are in considerable quantities at every farm-house. It is most judiciously remarked in conclusion, that "to make as much profit from cattle or sheep as is mentioned, requires a great advance of money; but in the article of swine hardly any is necessary, while most part of the articles consumed cannot in any other way be converted to beneficial purposes*."

Swine, it has been already observed, are very apt to get into forbidden ground; upon tillage farms, they are seldom, for this reason, permitted to go at large, unless sometimes for a few weeks on the stubbles. The number kept by any one farmer, is not often so large as to afford the expence of constant herding, nor so small as to admit of their being confined by a tether, as is sometimes done with the cottager's

* Brown's Treatise on Rural Affairs, vol. ii, p. 239. et seqq.

pig. On such farms, they are almost always confined to the straw-yards, or to a fold-yard beside their styes.—Another bad property in swine, is their habit of digging into the soil; for which, the most effectual preventive is to cut the two strong tendons of their snout, by a slight incision with a sharp knife, about an inch and a half from the nose. This may be done with little pain, and no prejudice to the animal, when about two or three months old. The common practice of restraining them by rings fixed in the snout, is painful and troublesome; they must be replaced as often as they give way, and that happens so frequently, that rings afford but little security against this nuisance.

3. *Styes* or swine-houses, a particular description of which will be found in another part of this Report, (See vol. i. p. 151), are set down in different situations, according to the numbers kept, and the manner of feeding them. The cottager erects a little hut contiguous to his dwelling, and many small farmers also choose to lodge them near the kitchen. If swine are kept chiefly in the straw-yard, their houses are so situated as to give ready access by a door which opens into it. The gentleman-farmer erects a range of low buildings on that side of his farm-offices which is least exposed to view, and incloses and subdivides a small yard for their use. Where swine husbandry is carried on in all its branches, there must be separate houses for sows heavy with young, and such as are nursing, for pigs newly weaned, for rearing and for fattening stock.

4. The *distempers* of swine are neither numerous nor often fatal. The *mange* or *itch* is the most common one, and may be removed by washing the skin of the animal with soap and water, or by the application of the ointment formerly recommended for curing the scab in sheep. The *measles*, or something resembling the leprosy, at times affects hogs. They become drowsy, small bluish spots appear on the tongue and other parts, and the roots of the bristles have the colour of blood. The disease is seldom fatal, and may be cured, it is said, by gentle doses of antimony.

CONCLUSION.

BESIDES the four kinds of live-stock which have been treated of in this chapter, there are several others of an inferior description, such as Rabbits, Poultry, &c. which have been commonly described under the general head of agricultural live-stock. But in Scotland, the number of these is either inconsiderable, and confined to a few districts, as is particularly the case with Rabbits and Goats; or their produce, as that of Bees and Poultry; is so insignificant to any one individual, that in a single chapter of a great work, which does not admit of minute details, it has been thought proper to omit them. In the Appendix, however, when describing the live-stock of each county, some account shall be given of these inferior species, wherever they have engaged the attention of the husbandman, and contributed in any considerable degree to his emolument.

The Appendix will also contain some particulars concerning the introduction of the Merino sheep into Scotland, and of their management and produce, furnished by gentlemen who write from their own experience. Some account of an extensive dairy, lately established at Glasgow, has been transmitted by the proprietor, for which the reader is also referred to that part of the work.

In such times as these, when the population of Britain is understood to exceed the means of subsistence obtained from her own soil, and when the consumption of animal food has materially increased among the great body of the people, it is of no less importance, to produce two pounds of meat, than two bushels of grain, from land which has hitherto produced only one. The natural produce, indeed, of a great part of Scotland, can be but little augmented by human industry; but the animals employed to convert it into the food of man,

and the materials of manufactures, may, by selection and skilful management, return a much greater and more valuable produce in beef, mutton and wool, from the herbage of our mountains. On the arable land of Scotland, such systems of husbandry have been adopted, as combine the production of animal and vegetable food upon the same farm instead of pursuing either of these objects exclusively, and in separate districts. The superior advantages of convertible husbandry, and alternate crops for the food of man, and of the inferior animals, can only be doubted by those who have had no opportunity of obtaining accurate information. This combination, indeed, in Scotland at least, is indispensable to the profitable production of either corn or animal food, on all soils susceptible of cultivation. These distinct, though not separate departments of husbandry, reciprocally contribute to the prosperity of each other; the revenue of the landholder and cultivator is augmented; and a much greater quantity of both sorts of food is sent to market for the general consumption, than could be obtained from land, the fertility of which is locked up in permanent pasture, or dissipated by perpetual aration.

CHAP. XV.ON RURAL ECONOMY, AND THE RELATIVE PRICES OF
PROVISIONS AND LABOUR.

BY ROBERT HOPE, FARMER AT FENTON, IN EAST-LOTHIAN.

PRELIMINARY OBSERVATIONS.

BEFORE entering into any particular detail regarding the subjects to be here treated of, it is proper to remark, that by some antiquated statutes, the Justices of the Peace were empowered to fix the prices of every kind of rural labour. It does not appear, however, that this authority was often exercised; these magistrates, with much wisdom, having commonly left the price of labour, like any other commodity in a well regulated market, to find its own level. Labourers in Scotland, were thus enabled to obtain the means of comfort, and of subsistence, proportionally to the state of agricultural improvement in the different districts, without being indebted to the interference of magistrates, or the arbitrary and vexatious regulations of poor or settlement laws, so prevalent in a neighbouring country. It is certainly for the interest of every state, that the relation between its different members, should be founded upon the justest, clearest, and most honourable principles, and more especially that between master and servant. Fortunately therefore, in this country, the connexion between the labourer and his employer, is fixed upon the basis of perfect liberty, and rational equality. The price of labour is thus left to the settlement of those most ca-

pable of ascertaining its real value, namely, the buyer and the seller; and the condition of the labourer, naturally take that form, the most agreeable to the wishes, and to the interests of the respective parties.

In discussing the subject to which this chapter relates, it is proposed to consider the state, 1. Of servants hired by the year, or for any other period of time; whether married or single; 2. Of those who are hired by the day, or who work by the piece; 3. Of cottagers attached to farms, and who are bound to assist in rural labour; 4. Of the mode of living adopted by labourers in Scotland; 5. Of the relative price of provisions and rural labour; 6. Of the price of fuel, as connected with the rate of labour; and, 7. Of the expence of raising the different sorts of grain cultivated in Scotland.

SECT. I.

OF SERVANTS HIRED BY THE YEAR, OR ANY OTHER PERIOD.

IN every nation the welfare of the lower classes of the people is an object of peculiar importance; more especially as those who must subsist by the produce of their daily labour, compose a great majority of every political society. It is to their patient industry, indeed, that the higher ranks of society are every where indebted for their principal enjoyments; and it is chiefly on them, that the public must depend for its security and strength. But of all descriptions of labourers, those employed in husbandry are by far the most valuable. They are constantly employed in providing food for the whole of the community, and they rear a hardy and numerous race, who not only supply the demands of agriculture, but also replace

the numbers that are lost in camps and cities, and in the various occupations of manufactures and commerce.

In regard to the payment of rural labour, it will always be found an advantage to both parties, to give the labourer an interest in the prosperity of the concern about which he is to be employed, without allowing him, at the same time, any interference with that part of the business which properly belongs to his employer. On this principle, the mode of paying servants in the produce of the farm, is productive of beneficial consequences. It is one great advantage attending this mode of payment, that servants, being but little accustomed to have much ready money in their possession, and seldom having occasion to go to market, either to purchase provisions, or for other purposes, are not liable to the same temptations as those who are paid in money alone. Hence the habits of sobriety and economy, so conspicuous among the farm-servants in Scotland; virtues, the merits of which cannot be too highly appreciated. Accordingly, the practice of hiring married servants for the year, is general through the greater part of Scotland, although that class is more numerous in some particular districts than in others. They commonly live in cottages attached to the farm where they are employed, and receive their wages, either wholly in kind, or partly in money, and partly in meal, together with the maintenance of a cow, and other perquisites to be afterwards enumerated.

The advantages of a cow to a poor man's family, are obvious; and the very prospect of enjoying such advantages, has an excellent effect upon the morals of young unmarried servants, who, in general, make it a point, to save as much of their yearly wages, as will enable them to purchase a cow, and furniture for a house, when they enter into the married state; which money, under different circumstances, would most probably have been spent in dissipation.

It has been objected to the payment of wages in kind, that when years of scarcity occur, the servants paid in this man-

ner have too much; and that in such seasons, all classes ought to bear a share of the general calamity. This objection might be obviated, by making it a part of the bargain, that in scarce seasons, masters may pay their servants in any meal that is wholesome, as in that of barley, peas or beans, mixed with oatmeal, as should be found most expedient. But certainly sound policy points out the labourers in husbandry, (upon whose exertions the whole nation so obviously depend for sustenance), as a class, whose strength for labour should never be lessened, by the want of a sufficiency of food.

Unmarried servants, both men and women, are generally hired for the half-year, and have their bed and board in their master's house.

Both married and unmarried men-servants, are occasionally employed about all the different by-jobs upon a farm; but their principal business is, to work horses, two of which is the constant charge of one man during the whole year.

In East-Lothian, Berwickshire, and Roxburghshire, the greatest proportion of farm-servants are married men, who are hired by the year. They receive their wages generally in kind, and are in a much more comfortable state, than those who receive the same rate of wages in money, as in other places. Perhaps there is no where to be met with, more active, respectable, and conscientious servants, more faithful to their employers, and, at the same time, more attentive to the interest of their own families, than this class. Not an instance occurs, of any of these people soliciting relief from the public, unless when by some accident they are disabled for labour, or overtaken by the infirmities of age. The wages of such servants, who are usually called *hinds*, are somewhat different in these counties, and even in the same county. In some cases they are paid altogether *in kind*; in others, they have a certain quantity of oatmeal, and so much money and in all, they have other perquisites to be afterwards mentioned.

In Berwickshire and East-Lothian, the usual wages ar

12 bolls, or 72 bushels of oats; 3 bolls, or 18 bushels of barley; and 2 bolls, or 8 bushels of peas *per annum*.

In Roxburghshire, the common wages are, 8 Teviotdale bolls (nearly 62 bushels) of oats, or 80 stones ($17\frac{1}{2}$ lb. to the stone) of oatmeal, = 100 stones English; 2 bolls (about $15\frac{1}{2}$ bushels) barley; 1 boll (about 6 bushels) peas, with from L. 3 to L. 5 in money.

In all these counties, besides a house and garden, for which they provide a reaper in harvest, they have a cow kept all the year, and a piece of ground for potatoes and flax, from one-sixth to one-tenth of an acre for each, in addition to the wages already mentioned. Each hind is also commonly allowed to keep a pig, and half a dozen of hens, or receives so much money, or sometimes four or six stones of pork, instead of this permission. Their fuel is carried home; in some places, as many carts as they choose to pay for at the coalhill; and in others, they are restricted to four carts, or about three tons. The hind has also his victuals in harvest from his master, and an allowance, commonly 6d. a journey, when sent from home with corn, or for coals and lime.

From what has been mentioned, it is evidently a difficult matter, to state exactly what is the money-value of a hind's wages for one year; but according to the prices of grain for the last three years, and putting a fair value upon other articles, the amount of their annual gains, taking into account their maintenance in harvest, and allowance for driving corn to market, may be estimated at L. 35 Sterling *per annum*. In some cases it is considerably more, especially when the cow is well maintained; but the above sum may be considered as an average. Shepherds have usually hands' wages, with the addition of from three to six sheep kept with the master's flock. Those servants who sow and track the corn, and conduct the operations upon the farm in the master's absence, have from one to five guineas, according to the size of the farm, more than the usual wages.

Unmarried men-servants, hired by the half year, and having their victuals in their master's house, receive at the rate of from L. 12 to L. 16 *per annum*; women-servants, also hired by the half year, have always both their board and washing in their master's house, and receive of wages at the rate of from L. 6 to L. 7 *per annum*; and in some instances, have half a peck of flax-seed, sown for the summer half year, in addition to the money they receive.

In the counties of Selkirk and Peebles, married men-servants receive their wages in money, and oatmeal, with a cow and other perquisites, in all about L. 12 of money, 6½ bolls of meal, the keep of a cow through the year, flax and potatoes to the same extent as in Berwickshire, with the carriage of a necessary quantity of fuel. In those counties, where a considerable proportion of the land is in grass, the shepherds receive, in some instances, the whole of their wages in the feeding of perhaps eighty sheep; but the more common practice is, to allow about forty or forty-five sheep in place of money and meal, a cow, flax, potatoes, and the carriage of fuel, the same as a ploughman, which altogether will exceed the amount of the ploughman's wages. Unmarried men-servants have from L. 12 to L. 18 *per annum*, with victuals; women-servants, L. 5 to L. 7 and L. 8, with board and washing; but those who are employed in the milking of ewes, have from L. 1, 1s. to L. 1, 10s. more for the summer half-year.

In the south-western counties, namely, those of Dumfries, Lanark, Renfrew, Galloway, Ayr and Dunbarton, where arable farms are generally of less extent than in the eastern districts, farmers, in many instances, hold their own ploughs, and perform nearly the whole work of the farm, with the assistance of their families; and when not wanted at home, their sons hire themselves out in the neighbourhood, frequently with a view of saving as much of their wages as to enable them to commence farmer in their turn. Married farm-servants are therefore not numerous in those counties, the regular farm-work being performed by unmarried men, hired by the year or half year, and maintained in the house of their

masters. In 1794, according to the Statistical Account of Scotland, the rate of wages in the three first-mentioned counties, was, for men-servants, from L. 7 to L. 10 *per annum*, with victuals, and from L. 2, 10 s. to L. 3, 10 s. for women-servants for the same term. As it appears from the county reports, that labour has advanced fully as much in these counties, as any where else in Scotland, within the last sixteen years, the present rate of wages, cannot be less than double the sums above mentioned. In Galloway, and in Ayrshire, men-servants, boarded in the farmer's family, receive from L. 14 to L. 20, and in some cases as high as L. 24 *per annum*; women-servants receive from L. 5 to L. 10 a-year. The dairy being an important concern in those counties, good wages are readily given to such women as thoroughly understand the business. In Galloway, such farm-servants as are married, live in cottages upon the farm, and are never hired for a shorter period than a year, often longer. They are paid partly in money, and partly by what is termed a *benefit*. This consists of a house, garden and fuel, as much corn, meal and potatoes, as are thought necessary for the maintenance of their families, and sometimes maintenance for a cow or a pig: the amount of the whole may be estimated, on an average, at L. 30 *per annum*. In the arable parts of Dunbartonshire, the rate of wages is much about the same as it is in the neighbouring districts of Renfrew and Lanark shire, namely, for men-servants, boarded in the farmer's house, from L. 12 to L. 18 a-year; for women-servants, from L. 5 to L. 6 a-year. In the county of Stirling, particularly among the farmers in the Carse, very few married servants are employed; and the demand is therefore principally confined to one class, as in most of the western counties. Unmarried servants' wages are thence higher than they probably would be under different circumstances, varying from L. 14 to L. 20, with victuals, *per annum*; women-servants from L. 4 to L. 6 *per annum*.

In the counties of Mid-Lothian, West-Lothian, Clack-

mannan, Kinross and Fife, a considerable proportion of the farm-servants are married men, living in cottages attached to the farms, and receive of wages from L. 8 to L. 12 of money a cow, six and a half bolls of oatmeal, land for flax and potatoes, with the carriage of a necessary quantity of fuel. In some instances they have a free house; in which case, the money part of their wages is 30 s. or 40 s. a-year less; and when the servant is not allowed a cow, he receives about L. 5 or L. 6 additional money, which is frequently the case in the neighbourhood of Edinburgh, where labourers are generally abundant, and pasture scarce. Unmarried male-servants have from L. 10 to L. 14 a-year with victuals; women-servants have from L. 4 to L. 6 *per annum*.

In Perth, Forfar, and Kincardine shire, a considerable part of the servants are also married men, and their wages somewhat similar to those in the above counties, namely, from L. 8 to L. 12, a cow, six and a half bolls of meal, with ground for flax, potatoes, and the carriage of fuel; unmarried male-servants have from L. 12 to L. 20 of yearly wages, with victuals. Upon some farms, where a number of unmarried servants are employed, they live in what is provincially called a *bothy*, that is to say, they have a room or cottage for themselves, where they prepare their victuals, eat and sleep. In lieu of victuals in the farmer's house, they receive two pecks of oatmeal a week, with from 8 d. to 1 s. a piece for milk, or a cow among three. This mode of keeping servants is peculiar to the north-east Lowlands, and some parts of Perthshire; but the practice appears to have nothing in it deserving of imitation, unless it can be proved, that it is for the interest of society, to teach men to dispense with the most innocent gratifications of a servile condition, and to lead a cheerless life. Women-servants, in these counties, have from L. 4 to L. 6 of wages *per annum*. It is proper here to observe, that in the Highlands of Perthshire, the price of labour is about a fourth part less than in the lowland district.

In the shires of Aberdeen, Banff and Moray, with the ad-

Joining county of Nairn, a great proportion of the farm-servants are unmarried men, hired by the year or half year, and boarded in the houses of the farmers. According to the Statistical Account of Scotland, the rates of wages in these counties at the date of that work, was, for men-servants from L. 6 to L. 8, and for women-servants from L. 2 to L. 3 *per annum*; but the price of labour appears to have risen there, about as much as in any other part of the kingdom, as from L. 10 to L. 18 a-year is now the current wages; and in some instances, men who can perform all the different operations upon a farm, such as ploughing, sowing, and stacking the corn, receive as high as L. 20 *per annum*, and women-servants have from L. 5 to L. 6 a-year, with their food always in the farmer's house. Fortunately for the interest of agriculture, the practice of employing married servants is spreading in these counties, as the large farmers generally have one or two of this description, whose wages are from L. 8 to L. 12 of money annually, with a cow, six bolls or six and a half bolls of oatmeal, a free house, and a small garden, and their fuel brought home by the farmer's horses. Many of the small farmers engage a married servant for nine months, allowing him three months in the summer to provide his fuel (peats), and to hire as a day labourer. In this case he has a small croft, and a little grass for his cow at night, when she is brought home from the farmer's cattle. He begins with assisting to cut down and harvest the corns, and ploughs and performs other farm-work till Whitsunday, when he is again released for other three months. During the nine months that he is a servant, he gets his breakfast and dinner in the farmer's house, and has an allowance in meal for his supper, his wages being from 1 s. to 2 s. a-day, according to his ability. The system, however, must be wretched where the plough is laid aside for three months in the year, and that at a time when the full benefit of good ploughing can best be obtained.

The price of labour appears formerly, to have been lower in Caithness, than in any other arable district in Scotland; for, according to the Statistical Accounts, from L. 2 to L. 3

in money, with six bolls of oatmeal, was, at that time, (about 1791), the yearly wages of an ordinary servant, the husband depending upon the aid of his wife, for rearing their family from her gains by spinning, working of nets, and, when near the sea-coast, assisting in the fisheries. But it now appears that the annual gains of an ordinary farm-servant will amount to about L. 20 Sterling, every thing included *.

In several of the Highland districts, regular farm-servants in many situations, are almost unknown. The farmers, more properly speaking, the cottagers, depend entirely upon their own personal labour, and that of their families, while the gentlemen get their operations carried on by *crofters* to their families, according to the terms of agreement for the crofts, or lots of land, the work being chiefly demanded during hay or corn harvest. This system, however, is going fast into disuse, and will be gradually renounced as improvements are introduced.

In those parts of Inverness-shire, and other northern districts wherever a regular system of agriculture is carried on, married servants receive from L. 10 to L. 12 of money, with six bolls of oatmeal, and ground for planting potatoes; and in some instances also the maintenance of a cow. In Ross and Cromarty they receive from L. 6 to L. 9, and six or seven and a half bolls of oatmeal *per annum*; and in some cases ground for potatoes, and a Scotch pint or half a pint of milk a-day, from Whitsunday to Martinmas. Unmarried farm-servants, and there are few of any other description employed in Argyleshire, receive from L. 8 to L. 14 *per annum* with victuals in the house of the farmer. Shepherds have six and a half bolls of oatmeal, with grass for one or two cows, and sixty or seventy sheep. Women-servants in Argyleshire have from L. 3 to L. 5 *per annum*, with victuals; in the northern districts they receive about 20 s. a-year less.

In the Hebrides, the price of labour is very different in the southern and northern islands. In the former,

* Caithness Report, p. 230.

servant capable of performing all the different operations upon a farm, is paid as high wages as in any part of the west of Scotland, which, with money, maintenance and other perquisites, amounts to about L. 30 Sterling *per annum*, and for a woman-servant from L. 18 to L. 20 a-year, (including board), is reckoned the average expence. But in the Lewis, Long Island, and even in Skye and Mull, about one-fourth may be deducted from this estimate. The general average, however, over the whole Hebrides, cannot be estimated at more than L. 18 for a man, and L. 12 for a woman; because a great many are hired on condition of getting leave of absence for a few weeks, or perhaps months in summer and autumn, for prosecuting the kelp manufacture, the fisheries, or some other business, unconnected with their regular annual engagements. This, however, cannot be considered an actual diminution of the wages of labour. They are not paid for a whole year, because they do not work so long with the farmer.

In Orkney, a great proportion of the men are engaged in the fisheries, which renders hands scarcer, and of course wages higher than might be expected, from the very limited demand for agricultural labourers. In 1794, according to the Statistical Account of Scotland, a man, capable of performing all the operations of husbandry, received from L. 3 to L. 4, 4s. *per annum*, with board, and a woman from L. 1 to L. 1, 10s. with board for the same term. It appears from the Orkney Report, recently printed, that these wages continue nearly the same.

In the Zetland Isles, regular farm-servants are unknown, almost every individual being engaged in the fisheries for a certain part of the year. Those who are engaged for a fixed term, have about L. 1, 4s., with liberty to go to the fishing during the summer, when they gain from 30s. to 40s., which, together, may amount to about L. 3 *per annum*, with victuals; women-servants engaged in husbandry have from 10s. to 15s. *per annum*, a shirt, and some other trifling perquisites. Those engaged as house-maids, have from 20s. to 25s. *per annum*, with victuals.

TABLE (A.)

The following TABLE will shew the Rates of Wages of Hired Farm-Servants in the different Counties of Scotland in 1794, and since 1804.

COUNTIES.	Married Servants' Wages in 1794.				Unmarried in 1794.		Married Servants' Wages since 1804.				Unmarried since 1804.	
	Grain bolls.	Meal bolls.	Money.	Cow.	Lint and Potatoes.	Wages, with Board.	Grain bolls.	Meal bolls.	Money.	Cow.	Lint and Potatoes.	Wages with Board.
East Lothian, Berwick and Roxburgh shires,	15	—	L. —	one	both	L. 8	17	—	£. —	one	both	L. 16
Selkirk and Peebles,	—	6½	6	one	both	7 0	—	6½	12	one	both	14 14
Dumfries and Galloway,	—	—	18	all included	—	8 0	—	—	30	all included	—	18 0
Ayr, Lanark and Renfrew,	—	—	—	—	—	10 0	—	—	—	—	—	20 0
Dunbarton and Stirling,	—	—	—	—	—	9 0	—	—	—	—	—	18 18
Lothians, Clackmannan, Kinross and Fife,	—	6½	6	one	both	7 7	—	6½	12	one	both	14 0
Perth, Forfar and Kincardine,	—	6½	7	one	both	8 0	—	6½	12	one	both	18 0
Aberdeen, Banff, Moray and Nairn,	—	6	6	one	both	6 0	—	6	10	one	both	18 0
Inverness and Argyle,	—	6	7	—	—	8 0	—	6	12	milk	both	14 0
Caithness,	—	6	6	—	—	5 0	—	6	9	milk	both	12 0
Hebrides, every thing included,	—	6	3	—	—	1 8	—	—	21	all included	—	—
Orkney,	—	—	—	—	—	12 0	—	—	—	—	—	18 0
Zetland Isles,	—	—	—	—	—	4 0	—	—	—	—	—	—
	—	—	—	—	—	3 0	—	—	—	—	—	—

SECT. II.

OF LABOURERS BY THE DAY OR THE PIECE.

NEXT to hired farm-servants, labourers employed in all the incidental, or by-jobs upon a farm, are the most valuable to the arable farmer, as without a sufficient supply of such hands, it is utterly impossible for him to carry on the various operations connected with an accurate system of agriculture, either in a perfect manner, or at the cheapest rate. It is evident indeed, that the farmer, who depends entirely upon his regular farm-servants, whose chief employment is working horses, must either allow many necessary jobs, that daily occur, to lie over, or if these are regularly performed by the ploughman, the horses must often be completely idle. Wherever agriculture, therefore, is carried on in any thing like a perfect system, it is always a matter of essential importance, to have at command, a sufficient number of this class of assistants.

Accordingly, along all the eastern coast of the kingdom, as well as in those midland counties where agriculture forms the principal business of the inhabitants, there is always a constant and regular demand for labourers; and although, no doubt, from the greater degree of fertility of the southern districts, a greater number must be employed, than what may be found in more northern counties, yet throughout the whole, the supply is in general equal to the demand. Upon every farm of considerable extent, therefore, several cottages attached to the farm are occupied by people of that character, who are sometimes hired by the year, but more commonly by the day, and are employed in all the by-jobs upon the farm; such as working at the threshing-mill, filling and

spreading dung, lime, and compost; also making and cleaning ditches, drains, and cross or *gaw* furrows, assisting at the hay and corn harvest, &c. &c. Those farms which have no cottages, or an insufficient number annexed to them, are supplied with labourers from the neighbouring towns and villages. These observations respecting labourers, apply to that part of the country which has been most properly denominated the South-East Lowlands, comprehending the counties of Roxburgh, Haddington, Linlithgow, Berwick and Edinburgh; but it may likewise be extended to the counties of Fife, Kinross, Stirling, Clackmannan, Perth, Forfar and Kincardine; while in the counties of Aberdeen, Banff, Moray and Nairn, where unmarried servants are generally employed, it is often found a difficult matter to procure a sufficient number of labourers, either male or female, as the practice of employing women in the labours of the field, during the spring and summer months, is not yet common; and a considerable portion of the time of many of the men, is taken up in digging and drying peats for the winter's fuel.

In that part of the kingdom denominated the Pastoral District, comprehending the counties of Galloway, Dumfries, Selkirk and Peebles, a scarcity of labourers has often been felt, unless when there is an influx from Ireland; but this is only what might naturally be expected, as, independent of the general preference given in these counties to unmarried servants, the system of husbandry adopted, is more connected with the rearing and feeding of cattle and sheep, than the cultivation of corn. The farms consequently are extensive, and few hands are found necessary for their management, in comparison of what would have been required, had the lands been more generally under tillage. Besides, a farm of many hundred acres, all in grass, and uninclosed, will seldom afford employment for a man in the capacity of a labourer, for one month in the whole year; while the extent of farms precludes him from finding ready employment with one farmer, when the work of another is finished. It is not to be wondered at, therefore, that an individual should

hesitate, before he sets himself down in a situation, where he is liable to such inconveniencies. Besides, the want of cottages is, in many situations, an insuperable bar to increasing the number of labourers; and as market towns and villages are but thinly scattered over these counties, with very few manufactories, little aid can be had from these ordinary sources, during either the hay or corn harvest.

In the manufacturing districts of the kingdom, comprehending Ayr, Renfrew, Lanark and Dunbarton, labourers are generally found in sufficient abundance for the demand. But as the arable farms are generally of small extent, they are seldom accommodated with cottages for the use of day-labourers. For servants of this description, the farmers are therefore obliged to have recourse to the neighbouring towns, villages, and public works, with which many parts of this district abound, and where people in the character of labourers, are always to be had, more especially from the West Highlands, and from Ireland.

In the Highland Districts of the kingdom, including the counties of Argyle, Inverness, Ross, Cromarty and Sutherland, to which Caithness may be added, wherever a regular system of husbandry is carried on, day-labourers are in general to be found, in sufficient numbers for the demand of the country; but in those places where little corn is cultivated, and especially along the western shores, and in the isles, where, from want of regular employment, great numbers of the inhabitants are obliged to leave their homes, in quest of work in other districts, cultivators often find the greatest scarcity of hands, when the weather is favourable, and the busy season arrives. They are therefore obliged to rely entirely upon their regular hired farm-servants, which compels them to keep a greater number than they would do under different circumstances. Where so many difficulties, arising from the climate, and the natural state of the country, are to be encountered, perhaps the best method would be, to diminish the extent of land in cultivation, and to attend chiefly

to grass, or to grant as much land, as would enable the cottager to raise potatoes and flax sufficient for his family, (which with the assistance of his family, he might cultivate at his leisure hours), and to call for his assistance when necessary. This would give the cottager something upon which he might rely, when he had it not in his power to work for hire, without enabling him, at the same time, to dispense with any opportunity which might offer to work to others. This manner of procuring labourers, has been acted upon by that intelligent and public spirited gentleman, Mr Campbell of Shawfield, who retains, in the island of Islay, from fifty to eighty labourers, who, whenever they themselves and his overseer think proper, are constantly employed by the day. Mr Macneil of Gigha, and Mr Macneill of Colonsay, also keep a number of cottagers, (who are in fact day-labourers), in a way somewhat similar.

Besides these two classes of labourers, there is a third consisting of women, boys and girls, who, upon all well cultivated arable farms, are regularly employed, during the spring and summer months, in gathering root-weeds, assisting at the hay-harvest, and hoeing and weeding drilled crops of every description. But it is principally where the turnip husbandry is extensively practised, that this class of labourers are regularly employed, and are essentially necessary. It is not, however, in one point of view alone, that this branch of agriculture so justly merits the attention of every patriot, or practical farmer, whose land is culculated for the growth of turnips. To give healthy employment to so many children, who otherwise, from being idle, would become a heavy burden upon their parents, is certainly an object worthy of the attention of every individual, who really feels a pleasure in the happiness of his fellow-creatures, more especially as the value of their labour, so amply compensates the outlay of their wages; for a boy or girl of twelve or fourteen years of age, for 8d. or 10d. will perform fully as much work in the hoeing or thinning of turnips, as could be done by a man at 2s. 6d. a-day. This

class of labourers, are widows, unmarried females, and the children of married hired servants, and day-labourers, who live in cottages upon the farm, and where farms are not furnished with cottages for the accommodation of people of this description, they are procured from neighbouring towns and villages. But as few farms in Scotland are situated so near towns or villages, as to enable the farmer to avail himself of their population, it is of the greatest importance, therefore, to have a sufficient number of cottages upon every farm, and to give a preference to married servants rather than to those in a single state *. In fact, the supply of labourers is found to be regulated entirely upon this principle, throughout the whole kingdom, and their plenty or scarcity in any district, can easily be known, by turning to that part of this chapter, where the different descriptions of farm-servants have been detailed.

* Both in Berwickshire and in Roxburghshire, farmers who cultivate a considerable extent of ground, and even those possessed of moderate sized farms, rarely keep above one unmarried servant: all the rest are married, and live in cottages on the farm. This plan is earnestly recommended to the adoption of other arable districts, as the assistance of the families of married servants is of such essential advantage to the arable farmer, and, at the same time, promotes the useful population of the country.

TABLE (B.)
A TABLE of the Prices of Labour in Scotland in 1790, and since 1804.*

NAMES OF COUNTIES.	Price of labour in 1790.								Price of labour since 1804.								Wages per day for women hoe- ing turnips, &c.	Year's gains, including hay and corn har- vest, in 1810.								
	Wages per week in winter.				Wages per week in summer.				Wages per week, with board, in harvest.				Wages per day for women.						Wages per week in summer.				Wages per week in harvest, with board.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.			s.	d.	s.	d.	s.	d.		
East, West and Mid Lothians,	6	0	7	0	6	0	5	0	10	0	13	6	0	35	8	0	10	0	29	14	27	10	0	21		
Berwick, Roxburgh and Selkirk,	6	0	7	0	6	0	5	0	10	0	13	6	0	35	8	0	10	0	27	10	27	10	0	21		
Dumfries and Peebles,	5	0	6	0	6	0	4	0	7	6	11	0	0	25	16	0	8	0	26	4	26	4	0	21		
Galloway,	5	0	6	0	7	0	9	0	8	0	11	0	0	26	4	0	1	0	29	14	27	10	0	21		
Ayr,	6	0	8	0	9	0	9	0	9	0	12	6	0	36	4	0	1	0	29	14	27	10	0	21		
Lanark and Renfrew,	6	0	7	0	7	0	7	0	8	6	11	6	0	27	10	0	1	0	27	10	27	10	0	21		
Dunbarton and Stirling,	6	0	7	0	7	0	7	0	8	6	11	6	0	27	10	0	1	0	27	10	27	10	0	21		
Clackmannan and Kinross,	5	0	7	0	6	6	5	0	8	0	11	0	0	26	4	0	0	0	26	4	26	4	0	21		
Perth, Fife and Forfar,	5	0	7	0	7	0	5	0	8	0	11	0	0	26	4	0	0	0	26	4	26	4	0	21		
Kincardine,	6	0	8	0	7	6	5	0	10	0	12	6	0	30	10	0	0	0	30	10	30	10	0	21		
Aberdeen, Banff, Moray and Nairn,	4	6	6	0	5	6	4	0	7	6	10	0	0	25	8	0	0	0	25	8	25	8	0	21		
Argyle and Inverness,	4	0	6	0	6	0	4	0	6	0	9	0	0	21	0	0	0	0	21	0	21	0	0	21		
Ross, Cromarty and Sutherland,	2	6	3	6	3	0	3	0	5	6	8	0	0	18	16	0	0	0	18	16	18	16	0	21		
Caithness,	3	0	5	6	6	0	4	0	6	0	9	0	0	21	0	0	0	0	21	0	21	0	0	21		
Orkney and Zetland,	3	0	6	0	4	0	4	0	4	0	6	0	0	18	16	0	0	0	18	16	18	16	0	21		

* In calculating the amount of a labourer's wages for the year, the plan here adopted is, to take 36 weeks at the summer's wages, and 16 weeks at the winter's wages, allowing the extra wages gained during the hay and corn harvest to make up for the days the labourer may be idle from wet and stormy weather.

TABLE (C.)

A TABLE of the Wages paid to Artisans connected with Agriculture, in 1790, and in 1804.

COMMUNICATIONS TO THE BOARD OF AGRICULTURE FROM	Blacksmith.		Carpenter.		Mason.		Thatcher.	
	1790. Shoeing.	1804. hoeing.	1790. By day.	1804. By day.	1790. By day.	1804. By day.	1790. By day.	1804. By day.
East Lothian,	s. 0 6 d. 0	s. 0 8 d. 0	s. 2 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 2 0 d. 0	s. 2 6 d. 6
Mid Lothian,	s. 0 6 d. 0	s. 0 9 d. 0	s. 1 4 d. 2	s. 3 6 d. 8	s. 3 6 d. 0	s. 3 6 d. 0	s. 1 3 d. 0	s. 2 6 d. 6
Forfarshire,	s. 0 9 d. 0	s. 1 0 d. 0	s. 1 6 d. 6	s. 1 8 d. 9	s. 2 9 d. 9	s. 2 9 d. 0	s. 1 2 d. 0	s. 1 6 d. 0
Kincardineshire	s. 0 6 d. 0	s. 0 9 d. 0	s. 1 4 d. 4	s. 2 2 d. 2	s. 2 8 d. 8	s. 2 8 d. 0	s. 1 2 d. 6	s. 2 0 d. 0
Fife and Perthshire,	s. 0 6 d. 0	s. 0 8 d. 10	s. 1 0 d. 0	s. 1 8 d. 4	s. 2 8 d. 0	s. 2 8 d. 0	s. 1 6 d. 6	s. 2 0 d. 0
Aberdeen, Elgin and Nairn,	s. 0 6 d. 0	s. 0 9 d. 0	s. 1 4 d. 4	s. 2 4 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 8 d. 4	s. 2 6 d. 0
Dumfriesshire,	s. 0 6 d. 0	s. 0 9 d. 0	s. 1 4 d. 4	s. 3 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 1 d. 1	s. 1 8 d. 0
Selkirk and Peebles,	s. 0 4 d. 4	s. 0 7 d. 7	s. 1 4 d. 4	s. 1 10 d. 4	s. 2 8 d. 0	s. 2 8 d. 0	s. 1 1 d. 1	s. 1 8 d. 0
Roxburgh,	s. 0 4 d. 4	s. 0 7 d. 7	s. 1 4 d. 4	s. 1 10 d. 4	s. 2 8 d. 0	s. 2 8 d. 0	s. 1 1 d. 1	s. 1 8 d. 0
Argyleshire,	s. 0 5 d. 5	s. 0 7 d. 7	s. 1 4 d. 4	s. 2 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 1 d. 1	s. 1 8 d. 0
Ross and Cromarty,	s. 0 6 d. 6	s. 0 10 d. 10	s. 1 4 d. 4	s. 2 6 d. 6	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 1 d. 1	s. 2 0 d. 0
Lanarkshire,	s. 10 6 d. 6	s. 15 0 d. 0	s. 1 6 d. 6	s. 3 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 6 d. 6	s. 2 0 d. 0
Berwickshire,	s. 0 6 d. 6	s. 0 8 d. 8	s. 1 6 d. 6	s. 3 0 d. 0	s. 3 0 d. 0	s. 3 0 d. 0	s. 1 6 d. 6	s. 2 0 d. 0
Ayrshire,	s. 13 0 d. 0	s. 19 0 d. 0	s. 1 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 1 6 d. 6	s. 2 9 d. 9
Lanarkshire,	s. 13 0 d. 0	s. 19 0 d. 0	s. 1 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 1 6 d. 6	s. 2 9 d. 9
Dumfriesshire,	s. 13 0 d. 0	s. 19 0 d. 0	s. 1 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 3 6 d. 6	s. 1 6 d. 6	s. 2 9 d. 9

* Per horse per ann.

† Per horse per ann.

‡ For labour only.

The two foregoing tables present a tolerably accurate view of the rise in the value of labour, in this part of the kingdom within the last twenty years; and as prices had been rising for several years previous to 1790, there cannot be least doubt, taking one kind of labour with another, since the year 1780, the value of every kind connected with husbandry, has risen at least 100 *per cent.* It might at first view be supposed, that those servants who are paid in kind have not had the same advance upon their wages, as the labourers in agriculture; but when the rise in price, with the additional quantity, and superior quality, of the grain, taken into consideration, with the increased price of the produce of a cow, together also with the additional quantity of produce, in consequence of the animal being better managed, (as a hind's cow, forty years ago, on account of her poverty, seldom had a calf oftener than once in two years) will then be evident, that the rise in the wages of this description of servants, has at least kept full pace with that of any other description of labourers.

At the same time, as the rise in the value of labour has been pretty uniform throughout the kingdom, the following Table, extracted from the Survey of Ayrshire, will give an idea of the rates of labour, during the course of last century and at present, with the gradual rise in periods of ten years.

TABLE (D.)

General View of the Progressive Increase in the Price of Rural Labour.

	1720.			1740.			1760.			1780.			1800.			1809.		
	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.	L.	s.	D.
Ploughman, p. half-year, with bed and board in the family,.....	1	0	0	1	15	0	2	10	0	4	0	0	9	0	0	12	0	0
Ditto, of inferior merit,.....	0	10	0	1	0	0	1	10	0	2	10	0	6	0	0	9	0	0
Best dairy or servant-maid,.....	0	8	4	0	15	0	1	0	0	1	10	0	3	0	0	5	0	0
Inferior ditto,.....	0	6	0	0	12	0	0	16	0	1	0	0	2	0	0	3	0	0
Herd,.....	0	4	0	0	6	0	0	12	0	0	18	0	1	10	0	2	0	0
Reapers, men, for 5 or 6 weeks, harvest-work,.....	0	6	0	0	10	0	0	15	0	1	1	0	2	15	0	3	10	0
Ditto, women, ditto,.....	0	4	6	0	7	6	0	11	0	0	16	0	2	2	0	2	10	0
Tailors, p. day, with food in the family,.....	0	0	2	0	0	3	0	0	4	0	0	9	0	1	6	0	2	6
Masons and wrights, with do.....	0	0	4	0	0	7	0	1	0	0	1	8	0	2	6	0	3	0
Common labourers, p. day, without food, men,.....	0	0	3	0	0	5	0	0	8	0	1	0	0	1	8	0	2	6
Ditto, ditto, women,.....	0	0	2	0	0	3	0	0	6	0	0	9	0	1	0	0	1	6
Mower, thatcher, carpenter or shoemaker, with food, p. day,.....	0	0	2½	0	0	4	0	0	7	0	1	2	0	1	6	0	2	0

Throughout the whole kingdom, the different class of farm-servants, generally work ten hours a-day, while the days are sufficiently long to admit of it; and during the winter months, the hours of labour are from the dawn of morning till twilight, with the allowance of about half an hour a-day for dinner. The only material deviation from the ten hours is supposed to be in the arable districts, during the harvest, as the reapers (shearers) work from the rising to the setting of the sun, with only an hour for breakfast, and another for dinner, with about twenty minutes in the forenoon and as long in the afternoon, for a rest; which latter allowance of time for resting is usually given even where the men only work from six o'clock in the morning till six o'clock in the evening; also in a circuit of 15 or 20 miles from Glasgow, where the hired servants, upon all farms and threshing-mills are not employed, are in the practice of threshing with the flail, the necessary quantity of food for the stock upon the farm, by candle light, in the winter months. Although ten hours is the general length of time for a day's work, during the spring, summer, and autumn months, yet farmers are by no means uniform in their mode of working, as some begin at five o'clock, rest three hours at mid-day, and fill up their day's work by beginning again at one o'clock, and ending at six o'clock evening, while others begin at six o'clock, and end at six o'clock, allowing an hour at breakfast and another at dinner. But, although these may be the ordinary hours, yet in no situation do farm-servants scruple to work either sooner or later, when occasion requires.

The class of labourers who are generally employed during the day, are at the same time frequently engaged, in working by the piece, in making and cleaning ditches, opening and filling drains, planting and cutting hedges, turning manure and spreading lime, composts, and dung, working in quarries, cutting both hay and corn, and, in a very great number of instances, even in threshing grain, &c. &c. But the performance of these different kinds of work, depends upon so many different circumstances, that it is scarcely pos-

to convey an accurate idea of the real expence of such operations. For instance, a ditch or drain may be opened for 1*s.* *per* rood, when in a different place of the very same farm, another rood of equal dimensions, may be executed for half the money, and yet the labourer may make more wages in the latter case, than he could do in the first; or a crop of hay, at 100 stones *per* acre, may be cut for 2*s.* 6*d.*, when, perhaps, the adjoining field, at 300 stones *per* acre, will be a hard bargain to cut for 10*s.* Working by the piece, however, in many kinds of work, is certainly the most eligible plan. For, as it proves a stimulus to exertion, it is more profitable to the labourer, and while it gives the employer the advantage of having his work executed with dispatch, it increases the quantity of productive labour in the country, and therefore must be a benefit to the community at large. Although the cutting of hay and corn is noticed as work done by the piece, yet it is by no means a general practice. From the great advantage resulting to the farmer, from having his crops cut by the very surface of the earth, and the difficulty of getting the labourers to go so low, when it is evidently their interest to get over the ground quickly, many of the most intelligent farmers decidedly prefer having their crops cut by day's wages*. It is evi-

* Mr Dungeon of Prura states, that some farmers prefer cutting hay by the piece, on the following grounds: 1. Because, by doing more work, fewer hands are required at a time when they are commonly much in demand, 2. Because there is no species of harvest work, in regard to which the farmer can suffer less from hurried work than that done with the scythe in cutting grass; and 3. Because in consequence of such expedition, the object of securing the hay is much sooner accomplished, which is often of incalculable importance. It is a fact universally admitted by every farmer of experience, that ever since improvements in agriculture have taken place, an acre, (never less than three-fourths of an acre), of the best hay was commonly cut *per* day by one man on piece-work; while now half these quantities is all we can have done of such hay in that time since day wages were introduced.

It is allowed by all experienced mowers, that it is more difficult to cut high than low, if the surface is smooth. If it is not, the farmer is to blame. When the land is well rolled, they give their scythe more *sole*, and sweep the surface

dently impossible to know exactly what wages a labourer is making in many instances, by merely knowing the price at which he works, without being acquainted with other particulars, such as the weight of a crop when cutting by the acre, or the hardness of the subsoil when making drains; the best way of coming at the truth, in a case of this nature is, to refer to the table of week's wages, (see table B); and as the gains from working by the piece, are regulated entirely by the rate of day's wages, so a knowledge of this latter circumstance, will lead a person easily to discover, what an acre of hay, for instance, alike in every respect, will be got cut for, in different districts of the kingdom: Thus, in East-Lothian, a labourer's wages is 13s. 6d. *per week*; in Argyle and Inverness it is 9s.; so that an acre of hay, that in the latter counties would cost 5s., would in the former cost 7s. 6d. in cutting, with every thing else in the same proportion.

The following table extracted from the Communications to the Board of Agriculture, contains an accurate account of the prices of different kinds of piece-work in East-Lothian, in the years 1790 and 1804:

close by the roots of the hay; and they confess this mode is much easier than to carry the scythe even an inch higher.

Some farmers prefer cutting by the day, professedly on account of the difficulty of getting the field measured, but that should in general be no objection. Most schoolmasters in Scotland can measure, some with great accuracy, and the expence is trifling. If any objection remains as to bad work, let a specimen be made at the commencement, and a penalty fixed for any variation from it. The best prohibitory article perhaps would be, to bind the contractor to accept of day wages, after all his exertion, on being detected in doing injustice. This has been acted upon with a happy effect.

The practice of cutting corn by *threaving*, (so much for every two stooks or shocks of 12 sheaves each), is also found advantageous in some of the north-eastern counties.

TABLE (E.)

Reap Wheat, 1795, p. acre.	d. s.	11	0	8
Reap Wheat, 1804, p. acre.	d. s.	0	8	0
Mow Barley, 1790, p. acre.	d. s.	0	4	0
Mow Barley, 1804, p. acre.	d. s.	0	1	0
Thresh Wheat, 1790, p. quart.	d. s.	4	8	0
Thresh Wheat, 1804, p. quart.	d. s.	0	1	0
Thresh Barley, 1790, p. quart.	d. s.	0	8	0
Thresh Barley, 1804, p. quart.	d. s.	0	0	0
Filling Earth, 1790, p. yard.	d. s.	1	0	0
Filling Earth, 1804, p. yard.	d. s.	0	0	0
Filling Dung, 1790, p. load.	d. s.	1	0	0
Filling Dung, 1804, p. load.	d. s.	0	8	0
Mow Hay, 1790, p. acre.	d. s.	0	5	0
Mow Hay, 1804, p. acre.	d. s.	0	0	0

The prices of piece-work in some other counties might have been given, but the proportion they bear to the above, corresponds so exactly to the rates of day's wages given in a former table (B), that it is unnecessary to insert them here. In fact, it is physically impossible, even for the person contracting to do piece-work, in digging drains by the rood, or spreading dung or earth or compost by the load, to say what wages *per day* he is to make, unless he knew the sort of soil, and size of the load, distance to be spread abroad, and a variety of other particulars.

SECT. III.

OF COTTAGES ATTACHED TO FARMS.

BESIDES the various labourers already described, tradesmen, such as weavers, shoemakers, carpenters, tailors, masons, &c. &c. are frequently found, who undertake to provide a reaper during harvest, by way of rent, for whose work they only receive their victuals, and certain perquisites attached to their cottages, as a small patch of ground for a garden, about the twentieth part of an acre sown with flax; what ashes and dung they can collect, carried out to manure some

ground for barley or potatoes ; a cart-load of fuel brought from the nearest place of sale, and liberty to keep some fowls. These cottages, in general, consist of one apartment, about 15 or 16 feet wide by 18 feet long. Though some of them are on a proper construction, yet in too many instances they are far from being comfortable, having neither a floor except of earth, nor ceiling. The windows, also, are very small, which may admit a little light, but are rarely calculated for the admission of fresh air. When sickness, therefore, comes into the poor man's family, the consequences are often fatal. At the same time, from the great expence of keeping up cottages, farmers are never anxious to have more than what are barely sufficient to accommodate the labourers, necessary for all the different operations of the farm. In most situations, therefore, tradesmen are gradually withdrawing themselves from the country, and taking up their residence in towns and villages.

From what has been stated, when treating of the different classes of servants and labourers, it is evident, that the number of cottages attached to farms, is very different in the various districts of the country. In all those counties where the practice is general, of employing a considerable number of married farm-servants, instead of having the whole of them single men, cottages are always to be readily had, for whatever number of hands may be necessary, as even the farmers do not hesitate, provided they have any length of lease, to erect an additional number, rather than not to be accommodated with the kind of servants they find most advantageous ; while, on the other hand, in those counties where unmarried servants are generally employed, a complaint that cottages are scarce is very common. It is certainly for the interest both of landlord and tenant, to remove, as quickly as possible, any ground for this complaint. For experience has clearly shewn that without a sufficient command of all kinds of labourers, it is in vain to expect that a judicious and profitable system of husbandry can be exercised ; and how are these to be pro-

cared, when the very source from which they should flow is lost to the community. In those districts where married servants and labourers reside upon the farms, there is scarcely a cottage but furnishes either a woman, girl, or boy, some of them many more, who are, during the spring and summer months, almost constantly in the fields whenever the weather is favourable. In those situations, then, where the number of cottages is so much reduced, the farmers must either draw their labourers from towns and villages, or the work, that is thought necessary, and which is performed in the eastern counties, must be entirely neglected. Under the former supposition, it is evident, that a full supply of hands can never be gained; for although male labourers may, and often do go several miles to their work, yet women, boys and girls, are not fond of going to any distance for employment. The latter supposition, therefore, must be the case, so that the author of the Ayrshire Survey, is perfectly correct when he observes, "that proprietors do not seem to perceive, that it is no less their duty, than it is their interest, to keep up the number, as well as to ameliorate the condition of labourers in husbandry *."

Throughout the manufacturing districts, together with Galloway and Dumfries shire, both proprietors and tenants have long felt the bad effects of such narrow minded policy; for the indigenous cottagers, being either driven from the country by neglect, or allured, by false expectations of profit, shut themselves up in loom-shops, or bury themselves and their children alive in cotton-mills, or other unwholesome manufactories, where their vigour is impaired, and their morals polluted; instead of these, their trusty servants, farmers have been obliged to employ, at a high rate, indolent and useless vagrants, many of them trained up in vicious habits, and the very dregs of society.

* Even cottagers holding immediately of the landlord, are discouraged, factors or land-stewards disliking the trouble of letting them houses, and collecting their paltry rents; while farmers, who are likely to derive benefit from their labours, are not friendly to such erections.

Great and sensibly as these evils are felt, it is probable that the present system will not be materially changed, till arable farms are generally of greater extent than they are at present. Whenever a farm extends to 200 acres, the tenant must always find it to be his interest to keep one or more servants in the capacity of labourers, if he can afford them employment through the whole year. When matters come to that state, difficulties soon disappear, as neat cottages, with constant employment, at liberal wages, will never fail, while human nature remains as at present, to raise up whatever number of hands the most perfect system of agriculture can require.

In those parts of the kingdom where cottages are most frequently found upon farms, more attention is paid to the comfort of the occupier, when new ones are erected, than can be found in those built thirty or forty years ago, particularly by making the windows larger, and to open when necessary, and also by setting apart a by-corner, into which the ash, and other filth from the house may be thrown, instead of allowing the dunghill to be placed within a step of the threshold, as is still too commonly to be seen in some districts, to the great injury of the health of the inhabitants, and the disgust of every stranger who witnesses such scenes.

The only exception to the general rule of cottagers holding their house directly from the farmer, and paying their rent by labour in harvest, is chiefly to be found in the remote Highlands and Western Isles, where, as was observed in the section concerning labourers, they hold of the proprietor, even sometimes under a lease, and pay their rent either in money, or by personal services.

SECT. IV.

OF THE MODE OF LIVING ADOPTED BY THE LABOURERS
IN SCOTLAND, AND THE PRICE OF PROVISIONS, AS AFFECTING RURAL LABOUR.

THE provision or food of farm-servants and labourers is various in the different districts of Scotland. In the South-east Lowlands, farm-servants, boarded in their master's house, have oatmeal porridge uniformly to breakfast; for the most part the same to supper; and broth and barley-bread, with pork, beef, mutton, eggs, or cheese to dinner; in some instances, in place of porridge, they have broth, or milk and potatoes to supper. Those living in their own houses always use porridge for breakfast, which is eaten along with milk, mostly skimmed, or small beer, or a species of beer made with treacle and water. For dinner, potatoe broth, or potatoes boiled down to a kind of thick soup, with a small quantity of any kind of fat, and seasoned with pepper and salt, eaten along with barley-bread, and sometimes with the addition of a little pickled pork or salt herring. For supper, bread and milk, or potatoes and milk. Beef or mutton is used very sparingly by this class of servants, but both these, and wheaten-bread, are gaining ground*.

Day labourers having no conveniency for cooking where

* Upon many farms in the south-east Lowlands, the hinds are in the practice of buying a pig six or eight weeks old, for which they pay from 14 s. to 16 s., and which they feed upon skimmed milk, barley-dust, and the refuse of their potatoes, till about Martinmas, when the animal is slaughtered, and salted for winter use, which enables the thrifty housewife, to have flesh meat for her family's dinner, two or three times a-week, for six months in the year.

they work, and being distant from home, carry their dinner to the field, which is for the most part a bottle of milk or small beer, with such a quantity of bread and cheese as they find necessary.

In the Pastoral Division of the kingdom, the style of living is, in some respects, similar to what is above described; only perhaps there may be less bread, and a greater proportion of potatoes used.

In the Manufacturing District, where farms are generally small, and servants boarded in the farmer's house, the manner of living is considered to be fully as good, as in any part of the kingdom. The servants often eat with the master, as well as work at the same labour in the fields; and as they are often the children of neighbouring farmers, it may readily be supposed, that fully as much attention will be paid to the preparation of a comfortable dinner, as is done where the master and servants dine in different apartments.

In the Central Division of the kingdom, the manner of living among the labourers in husbandry, is nearly similar to what is to be found among the same class in the Lothians, oatmeal porridge, with milk for breakfast; broth, or potatoe soup, with butcher meat at times for dinner, and porridge, or milk and potatoes to supper.

In the North-east Lowlands, the quantity of oatmeal in some instances is greater, and the proportion of butcher-meat uniformly less, than what is used by the labourers in the more southerly districts. In the Mearns, particularly, oatmeal, prepared in different ways, and served up with milk, forms two parts in three of their whole diet, the rest being composed of potatoes, or barley-broth, mixed with coleworts, cabbages, or other garden-stuffs. Cheap as fish is in that county, there is but very little eaten by farm servants; and even the variety of potatoes, and barley-broth in many cases, is not attended to, but the people content themselves with oatmeal three times a-day. Farm-servants in Aberdeenshire, like their brethren in the Mearns, are also

very fond of oatmeal, at least it forms a great proportion of their daily food; it is often prepared by the very simple process of putting a small quantity into a dish, and pouring boiling water upon it, when after being well stirred, a little sweet milk is added; this they call milk brose; but the most common fare is, *kail brose*, i. e. coleworts and water are boiled, and the juice poured upon the oatmeal, when the whole is stirred, and more boiling water added, till the article is found to be of a proper consistency.

In the counties lying along the Murray Frith, potatoes constitute a principal part of the food of the labouring classes, which, with milk or small herrings, and other kinds of white fish, are served up to the table for the greatest part of the year, at least twice a-day.

Throughout all the Highland districts, oatmeal is much more sparingly used as food, among the labouring classes, than in the lowland counties; though, where arable husbandry is practised, the farm-servants have oatmeal porridge to breakfast regularly, the same as in other parts of the country. But in the more remote uncultivated districts, along the western shores of Inverness, Ross, and Sutherland, and especially in the Western Isles, the inhabitants are satisfied with a very small proportion of oatmeal, or of barley-bread for their daily sustenance, potatoes and fish forming the principal part of their food. Indeed, the intelligent author of the Hebrides Report affirms, that the great body of the population, are contented with potatoes, and a little milk and fish, during nine months of the year, and rarely know what it is to taste flesh of any kind. Were they to live in the same manner as the labourers in Lothian or Berwickshire, the whole produce of their soil, in its present state of cultivation, would not maintain them during six or eight months in the year.

In Orkney and Zetland, the country people eat a good deal of oatmeal gruel. They often have tea to breakfast. They have plenty of milk in summer, in both counties; and

particularly in Zetland, they use a preparation from whey, called *bland**, which keeps many months, and is an excellent beverage, where fish, and often salt fish, is the principal food. Potatoes too form a considerable part of their food; and they have a considerable quantity of the Aberdeen red cabbage, or a sort much resembling it.

It has already been observed, that throughout the whole of Scotland, (some of the Highland districts excepted), reapers in harvest always have their victuals from the farmer during that season, which in general consist of porridge and milk for breakfast and supper, with bread and beer for dinner. A Scotch pint of porridge is the ordinary allowance for a man's breakfast; and a peck of oatmeal, is generally allowed to make nine of these pints. The bread for dinner is made either wholly of wheaten flour, or flour and oatmeal, and each loaf weighs about a pound, after being taken out of the oven, and costs from 3d. to 4½d., according to the quality, and the price of grain at the time. The quality of the beer is rarely so good as it ought to be, from the demand being far greater during harvest, than what the country brewers are accustomed to have: they are often ill accommodated with the necessary utensils to supply the increased demand of that season. Influenced by these considerations, many of the large farmers now brew such a quantity of beer as is necessary for supplying their reapers in harvest. Each individual receives a Scotch chopin, (nearly two English pints) of this beverage, as his allowance for dinner. The price to the farmer varies from 1s. 9d. to 2s. 3d. *per* gallon.

From the ready communication between all the different parts of the country, the prices of most of the necessaries of life are pretty uniform through the whole, at least those of meal, butcher-meat, butter and cheese, which articles can be and actually are, sent from one part of the kingdom to another.

* *Bland* is made by fermenting whey. It has an agreeable acid taste, and makes good punch, mixed with sugar and spirits.

Other, whenever the state of markets will afford a small profit and the expence of carriage. But the prices of potatoes, milk, poultry, eggs and fish, are not so uniform. Potatoes, from their great weight, in proportion to their value, and the latter articles, from being badly calculated for a distant carriage, will always be found cheaper in the country, and along the coast, than in towns or inland districts, in exact proportion to the expence of conveyance. At the same time, it is not an easy matter to state exactly what the real price of these latter-mentioned articles is, for often they are bought for a third of the price they cost in the same market, at another period of the same year.

Although the nominal price of provisions is often very different in the several districts of the kingdom, yet that variance is frequently more apparent than real; for a pound of lean beef, from an ox that had been scantily fed upon wet poor pasture, may be as dear at 6d., especially for making broth, as the same weight at 8d., from an animal that has been fully fed upon the richest pasture; and, upon the like principle, it is alleged, that the oatmeal of the Lowlands, gives heartier and more nourishing food, than the same article grown in an upland or highland district.

The style of living among the labouring classes of Scotland, has long and often been a subject of mirth or ridicule among their brethren in the South, as if it were impossible that men should be able to perform a hard day's work, whilst their principal food was only oatmeal porridge, or *gruel* as they term it. This seems to an English farmer quite incomprehensible. Those acquainted with Scotland, however, know well, that in those districts where oatmeal forms two-thirds of the diet, the people may stand a comparison in every point of view, with those of the same rank in any part of the universe. It has been justly remarked, in a work on the Husbandry of Scotland, recently published, that "No sight could possibly be more gratifying to any individual, who can contemplate with pleasure the happiness of his fellow-cres-

tures, than to see such colonies of hardy and industrious peasantry, as may be found in the Carse of Gowrie and Falkirk, and in the counties of East Lothian, Roxburgh, and Berwick." And as they are inferior to none in their corporal powers, it evidently appears, from the following remark, that, in a moral point of view, they rank among the very first class of labourers; for "any neglect in so essential a duty as that of educating their children, is held to be so scandalous, that hardly an instance of it is known. Boys and girls are invariably taught to read, and before their leaving school, the Bible is made perfectly familiar to them *."

In the preceding pages, a brief statement having been given, of the mode of living among the labouring classes in different districts of the kingdom, the following Table, collected from the different County Reports, and the Statistical Account of Scotland, will shew the prices of the necessaries of life, in the several counties, at the dates of the respective authorities.

* See Husbandry of Scotland, 2d. edit. vol. 2, p. 240 and 209.

A TABLE of Prices of the Necessaries of Life in the different Counties of Scotland in 1799, 99, 94.

COUNTRIES.	Date.	Wheat per Boll.			Barley per Boll.			Oats per Boll.			Pease per Boll.			Oatmeal per peck.		Butter a stone.		Cheese a stone.		Beef a lb.		Poultry each.		Geese each.		Eggs a doz.	
		L.	S.	D.	L.	S.	D.	L.	S.	D.	L.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.	S.	D.
East-Lothian,	1793	1	4	3	0	19	3	18	5	0	15	3	1	2						0	6	1	0	2	6	0	6
Fife,	1793	1	2	0	0	15	0	13	6	0	13	9	1	0								1	0	2	6	0	6
Selkirkshire,	1793	1	10	2	1	3	5	19	3	1	6	7										0	10	2	6	0	8
Roxburghshire,	1792	1	4	3	1	0	4	15	1	0	16	5	1	6	13	4	5	0	4	0	4	0	10	2	6	0	8
Inverness,	1792	1	0	0	0	18	0	15	0	0	15	0	0	11½								0	10	2	6	0	8
Nairn,	1792				0	17	0	14	0	0	14	0	0	10½								0	10	2	6	0	8
Banff,	1792	0	18	0	0	18	0	12	6				0	10	12	0	4	0	0	3	0	7	2	0	0	2	3
Clackmannan,	1792	1	0	0	1	0	6	14	6	0	14	0	1	0						0	4	0	8	2	6	0	3
Ayr,	1793	1	3	0	1	3	0	17	0				1	2								0	0	0	0	0	3
Moray,	1793	1	0	0	0	18	0	16	0	0	16	0	1	1						0	4	0	9	2	9	0	2
Orkney and Zetland,	1793																			0	0	0	0	0	0	0	3
Caithness,	1794				0	12	0	16	0											0	0	0	0	0	0	0	1
Ross and Cromarty,	1794				0	18	0	16	0											0	0	0	0	0	0	0	2
Argyle,	1794				0	19	0						1	2						0	0	0	0	0	0	0	2
Mid-Lothian,	1794	1	3	0	0	19	6	18	0	0	16	0	1	2						0	0	0	0	0	0	0	7
Forfar,	1794				0	16	0	15	0	0	14	0	1	0						0	0	0	0	0	0	0	5
Perth,	1794	1	1	0	0	16	0	12	0	0	12	0	1	0						0	0	0	0	0	0	0	4
Peebles,																				0	0	0	0	0	0	0	6
Galloway,	1801	1	12	0	1	8	6	15	0				1	1						0	6	1	2	3	0	0	7
Lenark,	1794	1	3	6	0	19	10	17	0	0	16	6	1	2						0	4	0	10	2	6	0	5
Dunbarton,	1793	1	1	6	0	17	4	16	0	0	16	0	1	0						0	0	1	0	2	6	0	4
Girling,	1793	1	2	0	0	19	6	16	6	0	16	0	1	2						0	5	1	0	2	6	0	6

TABLE (G).

The following TABLE will shew the Fairs Prices of Grain in the different Counties for Crop 1810, with the value of Potatoes and Butcher-Meat in different Districts of the Kingdom for the same year.

NAMES OF COUNTIES.	Wheat, per Boll.		Barley, per Boll.		Pease, per Boll.		Oats, per Boll.		Oatmeal, per Peck.		Potatoes, per Boll.		Beef, per lb.	
	L.	S. D.	L.	S. D.	L.	S. D.	L.	S. D.	L.	S. D.	L.	S. D.	L.	S. D.
Dumfries,	1	17 8	1	8 0	1	0 0	0	18 0	0	1 2½	—	—	0	0 8
Fife,	1	15 0	1	3 6	0	19 0	1	0 0	0	1 5	0	5 0	—	—
Kincardine,	1	11 10¼	1	1 0	0	17 4½	0	17 4	0	1 3	—	—	—	—
East-Lothian,	2	2 0	1	11 0¾	1	1 11¾	1	2 11¾	0	1 3	0	8 0	0	0 8
Berwick,	1	16 0	1	5 0	1	2 8	0	19 0	0	1 3½	—	—	0	0 8
Inverness,	1	15 0	1	12 0	1	8 0	1	0 0	0	1 4½	—	—	0	0 7
Moray,	1	14 0	1	10 0	1	6 0	1	0 0	0	1 4½	0	8 0	0	0 7
Banff,	1	12 0	1	0 0	1	0 0	0	18 6	0	1 2½	—	—	0	0 7
Aberdeen,	1	12 6	0	18 8	1	0 0	0	17 0	0	1 2	—	—	0	0 7
Roxburgh, Teviot measure,	2	8 4	1	14 0	1	10 0	1	3 0	—	—	—	—	—	—
Edinburgh,	1	19 0	1	7 6	1	1 0	0	18 0	0	1 3	0	6	0	0 8
Perth,	1	14 0	1	4 1	1	3 0	0	18 6	0	1 4½	—	—	—	—
• Ayr,	1	15 6	1	7 0	—	—	0	19 0	0	1 3½	—	—	—	—
• Forfar,	1	17 0	1	6 0	—	—	1	1 6	—	—	—	—	—	—
• Lanark, Glasgow market,	1	16 0	1	9 0	1	5 0	1	3 0	0	1 4	0	7 0	0	0 8
• Stirling,	1	16 6	1	12 0	1	3 0	1	2 0	0	1 4	0	12 0	0	0 8
• Dunbarton,	1	10 0	1	10 0	—	—	1	1 0	—	—	—	0	0 0	—
• Ross,	1	15 0	1	13 0	—	—	1	3 6	0	1 8	—	—	—	—

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For the counties marked thus *, the prices were extracted from the Farmer's Magazine, being the average of the highest returns of the three quarterly reports ending with May 1811.

In those counties which are not included in the above table, the price of provisions is regulated entirely by, and is always nearly similar to, the price of the market of the chief town in the district. Thus the prices of all the necessaries of life in Renfrewshire, are completely regulated by the Glasgow market; and even the western coast of Argyleshire, from requiring an annual supply of about 20,000 bolls of oatmeal, and which is chiefly brought from Glasgow, must be regulated by the same market. In Linlithgowshire also, prices depend entirely upon the Edinburgh market; and in the north, the Inverness market determines the prices for all the adjacent districts.

SECT. V.

OF THE RELATIVE PRICE OF PROVISIONS, AND OF RURAL LABOUR.

In England, a peck of wheat, and in Scotland, a peck of oatmeal, $8\frac{1}{4}$ lb. avoirdupois, (being the principal articles of subsistence of the lower orders of the people in the two countries), have long been considered as equivalent to the daily pay of a labourer.

In Scotland, this proceeded on the idea, that the price of meal, for a considerable space of time, was at such a rate, as would enable a labourer, to buy six pecks of meal per week, or nineteen and a half bolls *per annum*, each boll containing

140 lbs. avoirdupois, the value of which was considered to be adequate to the maintenance of himself and family.

The rate of wages before the Union, was from 5d. to 6d. *per day*, whilst meal on an average of about twenty-five years, prior to 1696, was 9s. *per boll*, or 6½d. *per peck*, so that the most indifferent labourer might earn, (when wages were at the rate of 5d. *per day*), as much money as was sufficient to purchase, one year with another, fourteen and a half bolls of meal, whilst the better sort might earn nineteen and a half bolls.

The nominal price of grain has certainly risen considerably within the last thirty years; yet, by comparing the prices of oatmeal in 1792 and 1810, (see Tables F and G), with the prices of labour at these two periods, it will clearly be seen, that the rise in the value of labour, has been far greater than the advance upon the price of oatmeal. Thus, according to the table of the prices of provisions, the average price of a peck of oatmeal, about 1792, was 1s. 1d. when, according to the table of the value of labour, the average price of a day's labour in summer, at the same period was 1s. 1½d. corresponding nearly to the value of a peck of oatmeal; while in 1810, the average price of a peck of oatmeal, was 1s. 3½d. and the average price of a day's labour is 1s. 10½d. which shews, in the most satisfactory manner, the very great improvement that has taken place in the lot of the labouring classes throughout this part of the united kingdom. In England, it appears, that the rate of wages has not risen in proportion to the increased price of provisions *. This is probably owing to the effects of the poor laws, which tend to derange the natural progress

* "By uniting wheat and provisions in one account, and comparing it with labour, it appears, that food (in England), has risen, through the last three periods of the eighteenth, and the beginning of the nineteenth centuries, in every case more than labour." Mr Arthur Young's *Inquiry into the progressive value of money in England*. See *Annals of Agriculture*, NO. 270, June 1812 - p. 90.

of rural economy. When left to itself, labour will always find its proper level.

Some may contend, that the advance upon the price of wheat, during the last thirty years, has been greater than even on the price of oats. But although the consumption of wheaten bread is yearly increasing among the labourers in Scotland, yet as oatmeal is still considered, by all descriptions of labourers, as the principal support of a family, the price of the quartern loaf is scarcely so much as spoken of, so long as oatmeal can be procured on fair and reasonable terms.

It is proper, however, to observe, that the price of potatoes has considerable influence on the rate of labour, though to what extent, it is hardly possible to appreciate, as the consumption varies so much in different years, according to the relative price of oatmeal and potatoes. In point of nourishment, it is believed that one peck of oatmeal, weighing $8\frac{1}{2}$ lb. avoirdupois, will go as far in supporting a family as two pecks, or 56 lb. of potatoes.

SECT. VI.

OF THE PRICE OF FUEL AS AFFECTING RURAL LABOUR.

NEXT to the price of provisions, there is no circumstance that has a greater tendency to affect rural labour, in a cold and moist climate, than the nature of the fuel made use of, and its price. These are points, therefore, of the utmost importance to discuss in a Treatise on Rural Economy.

In regard to the nature of the fuel used in Scotland, though wood is partially employed in some districts, yet coal and peat are the principal articles employed throughout the whole kingdom; and, fortunately for the people, wherever the for-

mer cannot be had, the latter is rarely deficient. In the shires of Roxburgh and Berwick, there are hardly any coal mines; but the inhabitants on the south-east side of these counties, are supplied from the adjoining county of Northumberland. Considerable quantities of coal are also brought into Berwickshire by the port of Eyemouth, and from the county of Edinburgh, for the inhabitants in the north-western district; while in the upland districts, though they burn some coal, yet peat is the prevailing fuel. Very little coal being wrought in the county of Dumfries, the inhabitants along the coast are supplied either from Cumberland, or by importation at the ports of Dumfries and Annan, while the people in the interior of the country use nothing but peat. Selkirkshire being entirely destitute of coal, the little quantity that is used is brought chiefly from Mid-Lothian, while the great mass of the population use peat exclusively. Galloway is also nearly destitute of coal; the far greater proportion of what is used there, being imported from the opposite coast of England, or brought round from Ayrshire, peat forming the principal article for fuel for all the inhabitants of the upland and interior districts of the county.

In the counties of Ayr, Renfrew, Lanark, Dunbarton, Stirling, Clackmannan, Kinross, Fife, and the three Lothians, coal is wrought in the greatest abundance, which, besides supplying the inhabitants, is exported to a very great amount; yet, although coal is there so very plentiful, many of the inhabitants, in the moorland parts of these counties, are obliged, from the badness of the roads, and the distance of carriage, to confine themselves almost exclusively to the use of peat, particularly in the high districts of the counties of Ayr and Lanark. Peebles-shire also produces a quantity of coal, but a great part of its inhabitants rely upon peat for their winter fuel. With the exception of a small quantity wrought near Campbelton in Argyleshire, all the other counties of Scotland, (Sutherland alone excepted), are entirely destitute of

coal, that article, when used, being imported from the southern counties.

Although coal is not found, at least worth working, in any part of the kingdom to the north of the river Eden in Fifeshire, (with the exception of the coal-mine recently worked, in the county of Sutherland), yet all the northern counties are regularly supplied, by importation from the Frith of Forth, and the north of England; coal being carried up the Tay, to Perth and Dundee, and indeed to all the ports around the shore, to the most northerly point of the kingdom. Along the western coasts of Argyle, Inverness, Ross and Sutherland, with the Hebrides, wherever the inhabitants use coal, they are generally supplied from the Clyde and the sea-ports of Ayrshire. But although a very considerable quantity of coal is imported into all those northern counties, the consumption is chiefly confined to the towns, and to people of property along the shore; for, excepting farm-servants in some of the well cultivated counties along the east coast, the great body of labourers generally use peat as their fuel. Indeed in all the upland districts, and interior Highlands, nothing else is ever thought of, at least, in these situations, the substitutes are but few and indifferent.

As coal, however, wherever it can be procured, is generally found cheaper as fuel, than peat, the consumption of it is gradually increasing throughout the Highlands, as well as in the moorland districts of the southern counties, according to the advancement of road-making, and other internal improvements in the respective districts of the country.

It must be admitted at the same time, that in too many instances, farmers are still to be found who, instead of purchasing coal, spend the summer months in digging and driving peat, when they might be much better employed, in cleaning their turnips and summer fallow, although their distance from coal should be considerable. For the remark made by Dr Keith in the Aberdeenshire Survey, is too applicable to many farmers in other districts, namely, to save

five guineas on coal, they often expend twenty in misapplying the labour of horses.

In the counties where coal is wrought, 8s. a ton may be reckoned about the average price at the pit. Any additional price that the inhabitants may pay, depends upon the distance to which the article must be carried. The common allowance of coal for farm-servants in these districts, (which is carried home by the farmer's carts and horses), is generally three tons *per annum*; and in many instances they get any quantity they want. Women and cottagers receive one ton for the same period. In the counties north of the river Tay, coal may be estimated at 20s. a ton, the quantity generally allowed farm-servants and cottagers for a year, but it requires great economy to make it serve for so long a time.

The following comparison between the expence of peat and coal as fuel, proves the great superiority of the latter. An ordinary farmer, if he burns nothing else than coal, cannot be allowed less than sixteen carts annually; of which the carriage by land, including the prime-cost on the hill, may on an average be 12s. *per cart*; in all L.9, 12s. Sterling annually.

The expence of manufacturing a proportion of the fuel required in peats will be as follows:

2 men and 4 women, four weeks casting, spreading, drying, leading and stacking peats. The men at the rate of only 1 s. 6 d. and the women at 1 s. <i>per day</i> ,	L. 8	8	0
Horses and carts, 2 weeks at 2 s. <i>per day</i> ,	2	8	0
	<hr/>		
	L. 10	16	0
The farmer may also consume 6 carts of coals, which			
at 12s. <i>per cart</i> , cost.....	3	12	0
	<hr/>		
Total,	L. 14	8	0

So that by manufacturing peats, in the proportion of 10 out of 16 carts, instead of buying coals, the farmer was out of pocket L.4, 16s. *per annum*; and if he had consumed nothing

but peat, the loss would have amounted to a far larger sum, besides the wear and tear of spades and wheel-barrows. It is likewise proper to remark, that peats can only be manufactured in the fine months of May, June and July, when the time of the farmer would be much better employed, in improving his land, repairing dikes, clearing ditches, &c. *.

It is utterly impossible to say what the average price of peat is, so much depends upon the state of the weather during the winning process. Indeed, it very rarely occurs that any are prepared for sale; but where that is the case, the price varies from 9 d. to 1 s. *per* cubic yard in favourable seasons. Proprietors, and others of superior rank, employ their servants and labourers in procuring, through summer, the necessary supply for the winter, while the poor people of both sexes, and all descriptions, labour in the moss for their own supply †.

Besides the articles already mentioned, wherever there are any woods or plantations, the thinnings and decayed branches are carefully gathered up for fuel; and in some parts of the central Highlands, which were formerly covered with forests of the Scotch pine, the inhabitants are very active in digging up the roots, which make an excellent fire, but the smoke is

* Statistical Account of Scotland, vol. xxi, p. 349.

† The following statement by Dr Young of Fawside, near Stonehaven, points out the superiority of coal over peat as a fuel. A poor woman was obliged to purchase peats during a scarcity of coals in winter. her daily consumption of peats cost her three halfpence: her annual quantity of coals was 2 bolls, each boll 36 stone Amsterdam weight, or containing about 212 pints. Coals generally sell at Stonehaven for about 5 s. *per* boll. the highest they have been known at was 6 s. 8 d. Her peat fire, (although at the common price of coals more than four times their value), was not near so serviceable. It is stated in the Dumfriess Report, p. 399, that 1 cart of coals is equal to 6 carts of peat. From 24 to 30 cart-loads of peat is considered sufficient for a cottager's family, having only one constant fire. Where peats are used as fuel, it is a prudent precaution in a rainy climate, to have peats sufficient for the consumption of two years. Peats a year old are much freer, and the quality is in every other respect superior. Inverness-shire Report, p. 297.

very offensive to strangers. Whins and broom are also used for fuel, when nothing better can conveniently be had. The burning of turf, or the surface of the land, is still practised in some places, but, to the great advantage of the country, this destructive practice is rapidly falling into disuse.

The mode of preparing peat for fuel is similar throughout the whole country, namely, one man employed, with a sharp spade made for the purpose, generally requires two women to carry the peat from the moss, to a firm piece of ground, where they lie till hard enough to be placed upon their edges in narrow heaps, in which state they remain till sufficiently dried, when they are carried home, and stacked for winter use. Great as the quantity undoubtedly is of peat-moss, in all the Highland and upland districts of the country, yet peat can by no means be reckoned a cheap fuel; for, owing to the difficulty of access to many of the mosses, and the wetness of the climate, which is particularly unfavourable to the *winning* or drying of peat, the labour and patience necessary for securing a sufficient supply, is often incredible, especially upon the shores of the Western Highlands, and in the Hebrides, where the inhabitants are obliged to have a fire in their houses during every day of the year. There the expence necessary for fuel is, in some cases, reckoned at a third part of the rent of the land; that is to say, many farmers who at present pay L. 150, would willingly pay L. 200 *per annum*, if the landlord would supply them and their servants with fuel.

It has been proposed by some intelligent men, to have a certain number of labourers, who should devote their whole attention, during the summer and autumn, to the digging and winning of peat, at some proper station, similar to a coal-work, for the purpose of supplying the neighbouring district with advantage to all parties concerned; but if from the precariousness and unsettled state of the weather, the exertion of the whole population is scarcely sufficient to secure a proper supply for winter use, how could a limited number of hands furnish what may be necessary? It is not the difficul-

ty of working, as one man has been known to cast seven tons a-day, nor the prime-cost of the article, (which in most cases is to be had for the working), but the difficulty in winning, and in some instances of carrying it home, that makes peat so expensive an article of fuel. In those places where the peat earth is of so soft and friable a texture, that it will not stand to be formed into peats, it is carted to some dry spot, where it is completely wrought into a paste, when it is formed into lumps like loaves, with the hands, and being allowed to dry, becomes hard and very durable as fuel; but as the expence is very great, nothing but necessity can sanction such a practice*.

The injudicious and irregular mode of cutting peats, which almost universally obtains, is in many respects a serious evil; and although this is uniformly acknowledged, yet scarcely an individual ever thinks of adopting any fixed rule of working the mosses, so as to obviate the evil complained of. It perhaps might be of advantage, "were all tenants bound to cut their mosses regularly, and at the same depth, so that in no place is the water allowed to stagnate. They should be made to level the bottom of every piece as soon as cut, and to cover it regularly with the parings taken off the surface. They should begin at the bottom, and proceed upwards, and open a drain if necessary to carry off superfluous water. If the ground, after being cut, is intended for pasture or cultivation, the peat may be cut to the clay, if the fall of the ground will admit of it. But when moss is scarce, it will be proper to leave a foot, or more, so that it may grow again. When it appears to need more moisture than it has, the outlet from it may be occasionally stopped; though in general there is more danger of its having too much than too little."

* Presses for squeezing the moss have been suggested, and sheds for drying it. Statistical Account, vol. vi, p. 8, Note.

Another kind of fuel, not much used, is coal dross, mixed with clay*, which makes a very lasting fire.

In the Island of North Ronaldsha, in Orkney, they use cow-dung in great quantities for fuel. They make it up into circular pieces, about two or three inches thick, and eight in diameter. These they stick against the walls of buildings to dry, and pile them up for winter use. This is done in summer; in the course of which they also dry great quantities of the strong tangles, or stalks of red ware, (*Fucus digitalis* of Linnæus), and pile them up as peats are piled in other places. There is no peat in this island, which compels the inhabitants to adopt these practices.

It appears by the Agricultural Report of Aberdeenshire, that when the peat or turf is of inferior quality, a little coal is mixed with it, which renders it more useful as fuel. "The unfavourable season of 1809 first taught the farmers in Aberdeenshire, when their peats were very ill dried, and their turf of a bad quality, to mix a small proportion of coals, which had a very great effect in rendering their otherwise bad fuel, both comfortable and serviceable. The mode of using them is this: The hearth is clean swept, and the small coals are put above the half-burnt peats, then the turf or imperfectly dried peat, is laid above the coals. After this has begun to cake, and is kindled completely, the coal is gently stirred, when it inflames and consumes the fuel that is of inferior quality."

* It was sometimes mixed with cow-dung gathered on the pastures, until the farmers were obliged to prevent such a practice, by punishing the offenders.

SECT. VII *.**ON THE EXPENCES OF CULTIVATION.**

In treating of this subject, it is necessary to premise, that there are two different courses of cropping, generally approved of and adopted on good soils in Scotland; the one being a course of six years, suited to a clay soil; and the other a course of four years, adapted to a dry friable soil, or what is commonly called turnip-land. Both of these have been already explained in the chapter on Arable Land. Several other courses are followed in particular situations, and much land is of such a quality as to admit an intermixture of the crops of both these rotations. But it is thought sufficient to attend to the two former only; as, if the subsequent estimates are tolerably accurate, it must be easy to apply them, with necessary modifications, to any other course.

There is not much land in Scotland that can be profitably cultivated for many years, by either of these courses, without more manure than the crops themselves afford. It is therefore very common to retain a part in pasture for two years or more, by which it is so much enriched, as to give large crops, and to require less manure when brought again into the rotation. This mode of management, however, does not affect the tillage courses in any other way; nor does it interfere with the expences of the land actually cultivated in any one year; as in the following calculations no putrescent manure is supposed to be purchased at any time.

* This section has been compiled from the communications of several correspondents.

It must also be understood, that the land is not only of a good quality, but in such a state as admits of regular management; that no extra expenditure is required for erecting houses and fences, for clearing the soil of stones, for drainage, or for embankment; but, on the contrary, that every necessary accommodation has been provided, and every considerable impediment removed. It is well known that in Scotland, tenants, even upon leases for nineteen years, actually expend considerable sums for some or all of these purposes; and that there are few farms which, for the first four or six years of a lease, produce such crops as fully replace all the charges incurred by the cultivator. Hence, besides the ordinary expences to be exhibited in this section, there is in most cases an extra expenditure, or loss by deficiency of produce, or both, to be apportioned over what may be called the productive years of a lease, and which must be replaced with the profits of capital, by an augmented produce, and by the price of that produce. It is impossible, however, to ascertain the amount of this debt, unless in particular instances. In the subsequent calculations, lime alone is brought into the account, because of its very general application, once at least in every period of nineteen or twenty-one years, except a farm be so situated, as to obtain the aid of other manures not less expensive.

There is one circumstance which renders it a matter of some difficulty to state with accuracy the expences of cultivation, even upon any particular farm, though under a specified course of management, and still more to extend such calculations to the arable land of Scotland generally. This difficulty arises from the uncertain value of the home consumption, which not only varies in price in different years and situations, but, as the articles must in general be estimated, without being brought to a public market, the only sure test for determining their value, different farmers may value the same articles differently.

In estimating the expence of any one acre or of any one crop, another difficulty occurs, from the circumstance, that these expences are not applied to either exclusively. The expences of a fallow or fallow-crop, for instance, must be apportioned over all the years and all the crops of the rotation; and as these crops are introduced in different proportions, and are productive in different degrees, it must be evident, that the cost of a quarter of each of the several kinds of grain cultivated, cannot be ascertained with perfect accuracy, even though the expences of the whole course are exactly known.

The expences of cultivation are a good deal varied by the extent of the occupation. On a small farm, they must be, in general, much higher, than on one so large as to admit of a systematic arrangement of crops and live-stock, and, in some degree, of a division of labour. The cultivator upon a small scale cannot avail himself of the most effective, but in the first instance the most expensive, implements and machinery: The threshing-mill, in particular, gives to the farmer of a considerable extent of land a great advantage over the occupier of a very small farm. It will therefore be necessary to take a farm that employs several ploughs, as the basis of calculation; and in order to introduce the implements of the best cultivated districts, a farm of 300 English acres, which may be considered a moderate size, may afford a more convenient illustration, than a very large or a very small one.

The capital of every cultivator is necessarily divided into two parts, which require to be distinguished. The one is partly expended on implements or permanent stock of a more or less perishable nature, and partly vested in the soil; for this the farmer is entitled to a certain rate of interest, or an annuity that will replace that part of his capital. The other is employed in defraying the necessary charges as they occur throughout the year, the whole of which should be replaced by the yearly produce. These two branches of expence are first both in the order of time and in magnitude of amount.

The next head of expence is rent. Some confusion of ideas has prevailed on this point, as if the amount of rent was not a necessary and unavoidable charge upon cultivation, but was, in part at least, a voluntary expence on the part of the cultivator. Such an idea is equally inconsistent with correct general views, and with the details of practice. The cultivator must pay to the proprietor of land, as well as to the labourer, and indeed to all whom he employs, the market value of their respective commodities at the time,—or he must withdraw from his profession. The circumstances upon which this value depends form no part of the present inquiry.

Taxes, direct and indirect, constitute a very considerable charge against cultivation; and some of them, such as the tax on property and on farm-horses, are considered directly hostile to production. The former description of taxes, however, must, in ordinary cases, fall upon the proprietor, and it is therefore only necessary to include their amount in estimating the rent; and the latter would require to be traced through so many channels, that it would be almost impossible, in a work of this nature, to exhibit any satisfactory statement of their amount; or to calculate the proportion, in which the charges of cultivation, and the prices of produce, are enhanced by the complicated operation of taxes.

The prices of land-produce, besides defraying all these charges, must leave a balance to the cultivator equal to the common profits of trade; that is, it must be sufficient to pay him the usual interest of money, to cover losses, and to remunerate him for his time and talents. Though it may seem a solecism to place the profits of trade among the expences of cultivation, it is nevertheless sufficiently obvious, that these profits must be realized, as certainly as the expences must be replaced.

As horse-labour forms a large portion of the charges of cultivation under the second head, it may be thought the most simple and natural course would be, first to ascertain the cost

of a man and a pair of horses throughout the year, and then to charge so much a-day against the work in which they are successively employed, such as ploughing, harrowing, carting, &c. The result obtained in this way would no doubt exhibit the expence of any particular operation, in any given circumstances, or perhaps of any particular farm, more distinctly than is done by the common method of dividing the expences by the number of acres cultivated; but this mode, besides the obvious objection to its minuteness and prolixity, would not give a nearer approximation to the truth, in regard to the cultivation of arable land generally. The number of acres that may be cultivated by a pair of horses does vary indeed, in different situations, according to the nature of the soil and the course of crops, and also according as a farm is more or less distant from markets, manure and fuel; but from the several statements that have been presented from different districts*, it does not seem difficult to fix on what may be termed an average number of acres, both on heavy and light soils. After a careful perusal of these and other documents, the writer of this article is inclined to consider fifty English acres of a clay-soil, and sixty acres of a turnip-soil, the former cultivated according to a six years' course, and the latter to one of four years, to be quite as much as two horses usually work in a sufficient manner, performing at the same time all carriages, that of lime included, and having no assistance from supernumeraries.

After these explanations, which seemed necessary for enabling the general reader more readily to understand the following calculations, it may be proper to state the several articles of expence under the different heads already mentioned; first, in regard to clay, and, second, to turnip soils.

* Husbandry of Scotland, vol. i. p. 139.

I. CLAY LAND.

1. *Permanent and fixed stock for a farm of 300 English acres.*

12 horses at L. 50,	-	-	-	L. 600	0	0
1 saddle ditto,	-	-	-	40	0	0
Harness and stable furniture for the whole,	-	-	-	65	0	0
6 ploughs fully mounted at L. 4,	-	-	-	24	0	0
2 small weeding ploughs at L. 2, 10 s.	-	-	-	5	0	0
6 pair of harrows,	}	at L. 2, 10 s.	-	20	0	0
2 pair grass-seed ditto,						
1 pair of brake ditto,	-	-	-	5	5	0
2 rollers,	-	-	-	10	10	0
2 drill-barrows for beans,	-	-	-	1	10	0
6 box-carts at L. 15,	-	-	-	90	0	0
6 corn or hay ditto at L. 4, 4 s.	-	-	-	25	4	0
Hand and wheel barrows, forks, graips, shovels, and cart ropes,	-	-	-	6	0	0
Corn bags, weights and measures, hand-hoes, riddles and other barn-looms, scythes and rakes,	-	-	-	20	0	0
* Threshing-machine and fanners,	-	-	-	170	0	0
Carry forward,				L. 1082	9	0

* Besides this sum, which is merely the expence of the machine itself, with the necessary fanners, a further sum might have been charged for bringing on and carrying away the water, for the buildings required for a machine worked by wind; or for the shed and horse-course of a machine worked by horses. But it was thought better to confine the charge to the machinery itself; for, though a considerable additional expence must be incurred on these accounts, it has been supposed, in the preliminary remarks, that the necessary accommodations have been already provided, either by the landlord or a former tenant. As the mill may be of some value at the end of an ordinary lease, nothing has been charged for annual repairs under the second head.

It ought also to be noticed, that the prices of several of the articles under this head vary considerably in different districts, according to the materials and workmanship. In Edinburgh, for instance, where all sorts of implements are

	Brought forward,	L. 1082	9	0
• Lime 48 bolls, (288 bushels) <i>per</i> acre at 2s. 6d. =				
L. 6 × 300 =		1800	0	0
<hr/>				
<i>Permanent and fixed</i> stock for 300 acres,		L. 2882	9	0
for 50 acres,		480	8	2
for one acre,		9	12	2

† Interest or annuity at 10 *per cent.* to maintain the present value of this stock, and to return the money expended on lime; besides annual *repairs* to be charged under the next head, and the common interest of money under the last one.

For 300 acres,	-	L. 288	4	10 $\frac{3}{4}$
For 50 acres,	-	48	0	9 $\frac{3}{4}$
For one acre,	-	0	19	2 $\frac{3}{4}$

2. Annual charges.

‡ 1 <i>Grieve</i> , or upper servant,	-	L. 40	0	0
<hr/>				
Carry forward,		L. 40	0	0

made in the best style, common harrows cost from L. 3, 3s. to L. 3, 10s. *per* pair, and a cast-iron roller L. 18, 18s. There are also several useful articles omitted, such as straw-cutters, corn-bruisers, pedestals for corn stacks, and steel-yards, because these implements are not yet in general use.

• The lime is understood to have been all laid on in the course of the first rotation of six years. Nothing is charged for carriage, as 50 acres only (instead of 60 according to some statements), are assigned to a pair of horses. Upon 300 acres, then, one pair of horses more has been charged, during the whole lease, the expence of which, if saved, may be equal to the carriage of the whole lime during the first six years.

† In considering this charge, it must be kept in view, that nearly all the articles must be renewed at least once, some of them three or four times during a lease of nineteen years.— The capital expended on lime is wholly sunk. According to the principles of annuities, this sum sunk at the end of three years, (the medium of six), and to be returned in the remaining sixteen years of a nineteen years' lease, is equal to an annuity for sixteen years of more than L. 166.— The charge made above is L. 180 for nineteen years; a difference which will be fully absorbed by the other articles of the account, particularly horses.

‡ If the farmer is overseer himself, he is entitled to at least the sum charged on this account, as wages for superintending individual operations, as much so

	Brought forward,	L. 40	0	0
6 ploughmen at L. 35,	-	210	0	0
2 labourers at L. 30,	-	60	0	0
Occasional labourers,—gathering weeds, spreading dung, hoeing drilled crops, cleaning grain, &c.	-	60	0	0
Wright, smith, and saddler, for repairs only,	-	50	0	0
* Horses, 12 horses, 15 quarters of oats for each, 180				
1 ditto,	10			
<hr/>				
	190 at 25 s.	L. 237	10	0
Grass and tares for soiling at L. 7 each,	-	91	0	0
1300 stones, (22 lb.) hay at 10 d.		54	3	4
Potatoes, yams, or Swedish tur- nips, three acres at L. 7, 10 s.		22	10	0
			<hr/>	405 3 4
Seed for 200 acres, 100 of wheat, 50 of beans, and 50 of oats, at an average 25 s. per acre, hence 25 × 200,				250 0 0
			<hr/>	
	Carry forward,	L. 1075	3	4

indeed as any servant on the farm. A remuneration for attending reapers in harvest, hay-makers, women and boys, when gathering weeds, hoeing drilled crops, &c. is quite distinct from profits. To confine his attention to any one of these operations, instead of keeping a watchful eye over the whole, would be attended with loss, in almost every case.

* The quantity and price of the oats are both given upon the supposition that part of them are light, such as are driven out by the fanners in cleaning the marketable grain. For this reason the quantity is a little more, and the price somewhat lower, than have been usually charged. No charge is made for the straw consumed by the horses, because it is not placed to the credit of the grain crops in the subsequent calculations. The straw and dung are understood to balance each other. The consumption of the oats is as follows.

15. quarters oats = 120 bushels × 8 feeds = 960 feeds.
3 feeds daily for 8 months = 243 days = 729
2 feeds daily for 4 months = 122 days = 244
----- 973 feeds.

Brought forward,	L. 1075	3	4
Seed for 50 acres of clover and rye-grass,	50	0	0
Mowing, hay-making, and stacking 25 acres of clover and rye-grass, the other 25 pastured, or cut green for soiling by the ordinary labourers, 15 s. <i>per</i> acre,	18	15	0
Reaping 200 acres at 12 s.	120	0	0
Incidental charges, loading carts on the field, building and covering stacks, &c. 2 s. 6 d.	25	0	0
Expences at market, and in delivering grain, bringing home coals, &c.	20	0	0
Insurance, and repairs of houses and fences, two and a half <i>per cent.</i> on L. 2000, their supposed value,	50	0	0
<hr/>			
<i>Annual charges</i> for 300 acres,	L. 1358	18	4
for 50 acres,	226	9	8½
for one acre,	4	10	7
<hr/>			

These two heads of charge, viz. an annuity on permanent and fixed stock, and the amount of the annual expenditure, must be defrayed by the produce in the first place, and it is only from the residue that taxes, rent, and profit, can be discharged.

For the first, the charge is, <i>per</i> acre,	-	-	L. 0	19	2½
And for the second,	-	-	-	4	10 7

Amount chargeable on every acre,	-	-	L. 5	9	9½
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Before adding the rent to this sum, the course of cropping must be attended to, which is fallow, wheat, clover, and rye-grass, oats, beans, and wheat, two-sixths or one-third being in wheat, one-sixth in beans, one-sixth in oats, and one-sixth in clover. Only five acres out of six are therefore productive, and upon these the whole expences must be charged.

Thus $L. 5 : 9 : 9\frac{1}{2} \times 6 = L. 32 : 18 : 10\frac{1}{2} \div 5 = L. 6 \ 11 \ 9\frac{1}{4}$ which is the amount chargeable on each productive acre.

To avoid minute calculations, let it be supposed that the clover pays its own proportion of the expences, in hay, soil-

ing, or pasture, which is more than it is worth in most situations; and also the charges incurred in its consumption, whether by sheep or cattle; and the account will now be confined to the four crops of grain, which are chargeable with an expence of L. 26 : 7 : 1, and the rent of the whole six acres.

3. *Rent.*

For land of a quality that shall produce the crops after mentioned, a rent of L. 3 *per* English acre cannot be considered too high, upon an average of the last seven years.— To this must be added about 4 s. for taxes on saddle and work horses, (the former being a necessary charge upon farms above a certain rent), for road-money, poor's rates, (though this charge is not general), schoolmaster's salary, militia assessments, &c. Rent and direct* taxes may thus be taken at L. 3, 4 s. *per* English acre, or L. 4 *per* Scotch.

Expences as above,	-	-	L. 26	7	1
Rent of six acres at L. 3, 4 s.	-	-	19	4	0
<hr/>					
Chargeable on four acres,	-	-	L. 45	11	1
on one acre,	-	-	11	7	9½
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4. *Profits of Trade.*

From what has been already stated, the capital required for a farm of the size, and under the management specified, may be easily ascertained.

† The amount of permanent and fixed stock is	L. 2882	9	0
Annual charges,	-	-	1358 18 4
<hr/>			
Carry forward,	L. 4241	7	4

* All indirect taxes must fall upon the income of the tenant as upon that of any other individual. Part of the property-tax indeed will generally be deducted from the rent, that is, so far as the charge exceeds the usual income of farmers; and some allowance has been made on that account accordingly.

† It may be thought that a part of the capital expended on lime may be obtained from the annual profits of the farm before it is all required; but it is well

Brought forward,	L. 4241	7	4
Stock for soiling and pasture, and for straw-			
yards, 25 cattle at L. 10,	250	0	0
* First year's dung, usually purchased from			
the former tenant, 800 yards at 3 s:	120	0	0
	<hr/>		
	L. 4611	7	4

which is L. 15 : 7 : 5 *per* acre, independent of the farmer's maintenance, and any deficiency in the produce to discharge the first year's rent †.

If the profits of this capital, including the interest, are taken at no more than 10 *per cent.*, there must be added to the charges against each acre L. 1 : 10 : 9, and to the charges against four acres, $L. 1 : 10 : 9 \times 4 = L. 4 : 40 : 36 = L. 1 : 10 : 9$ *per* acre.

The whole charges of cultivation, on an average of the best clay soils of Scotland, may now be brought under one view.

Charges on every acre.

1. Permanent and fixed stock,	-	-	L. 0	19	2½
2. Annual expences,	-	-	4	10	7
3. Rent and taxes,	-	-	3	4	0
4. Profits of trade,	-	-	1	10	9
			<hr/>		
			L. 10	4	6½

known, that a farm seldom leaves any surplus in the first six years. The charge for the whole money ought not in strictness to begin sooner than the fourth year; but the very moderate allowance of 10 *per cent.* makes this difference immaterial.

* No charge was made for dung under the former heads, because the amount may be expected from the next tenant at the end of the lease. But the price is advanced in the meantime from the capital of the tenant.

† The only charges that can be supposed to apply to the tenant in the former accounts, are, house rent and carriage of fuel, the latter being included in the expences of horse-labour, and the former in the rent of the farm. Not even the milk of a cow has been allowed him.

Charges on each productive acre.

1. and 2. articles, (see p. 278.),	-	-	L. 6 11 9½
3. Rent, (6 acres = L. 19, 4 s. ÷ 5 =),	-	-	3 16 9½
4. Profits, (L. 1 : 10 : 9 × 6 = L. 9 : 4 : 6 ÷ 5 =),			1 16 10½
			<hr/>
			L. 12 5 5½
			<hr/>

Charges on each acre under grain.

1. and 2. articles,	-	-	-	L. 6 11 9½
3. Rent, (L. 19, 4 s. ÷ 4 =),	-	-	-	4 16 0
4. Profits, (L. 1 : 10 : 9 × 6 = L. 9 : 4 : 6 ÷ 4 =),				2 6 1½
				<hr/>
				L. 13 13 10½
				<hr/>

It may now be proper to place against this sum the full produce of these crops, both seed and horse corn having been already charged.

Two acres under wheat, at three and a half quarters each, or 56 bushels,	
One ditto under beans,	27
One ditto under oats at six and a half quarters, or	52
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Four acres, total 135 bushels.

Now, $L. 13 : 13 : 10\frac{1}{2} \times 4 = L. 54 : 15 : 7 \div 135 = 8 \text{ s. } 1\frac{1}{2} \text{ d.}$ which is the average price of every bushel.

To find the price of wheat alone, take the principles of the present corn-laws, by which one bushel of wheat = one and a half bushel of beans = two bushels of barley = three bushels of oats:

Then two acres of wheat as before,	-	56 bushels.
One acre of beans,	-	18
of oats,	-	17½
		<hr/>

Produce of four acres,	-	91.33g
of one acre,	-	22.83g

Hence $L. 13 : 13 : 10\frac{1}{2} \div 22.83g = 12 \text{ s. a bushel nearly.}$

This sum may be thus divided among the several heads of expence.

	per acre.	per bushel.
1. Expences of cultivation, first and second articles, - -	L. 6 11 9½	L. 0 5 9½
2. Rent, - - -	4 16 0	0 4 2½
3. Profits of trade, - - -	2 6 1½	0 2 0
	<hr/>	<hr/>
	L. 13 13 10½	L. 0 12 0

By the same mode of calculation, the expence of beans is 8s., of barley 6s., and of oats 4s. *per bushel*.*

II. TURNIP-LAND.

1. *Permanent and fixed Stock.*

10 horses at L. 50, - - -	L. 500 0 0
† 1 saddle ditto, - - -	40 0 0
Harness, - - -	55 0 0
5 ploughs, - - -	20 0 0
	<hr/>
Carry forward,	L. 615 0 0

* If a farm is so situated, or of such a quality of land, as to enable the cultivator to dispense with the lime charged, the sum of L. 1 : 8 : 9½ must be deducted from the amount of the first and second articles, or L. 6 : 11 : 9½, leaving the balance of L. 5 : 2 : 11½ as the expences of cultivation on each of the five productive acres. This deduction would reduce the cost about 1s. 5d. *per bushel* of wheat, and of other grain in proportion.

† The saddle-horse charged in this and the former account, is necessary for the person who transacts the purchases and sales of the concern; and for supplying the place of any of the work-horses that may be occasionally laid aside by accident or disease. It cannot be considered as a gratuitous charge for the accommodation of the farmer himself.

Brought forward, :	L. 615	0	0
* 2 weeding ploughs or scufflers, - -	5	0	0
5 pair of harrows, and two pair grass-seed ditto, -	17	10	0
1 pair of brake ditto, - - -	5	5	0
1 roller, - - - -	5	5	0
1 double-drill turnip-barrow, - - - -	8	8	0
5 box-carts at L. 15, and 5 corn ditto at L. 4, 4 s. -	96	0	0
Barrows, forks, graips, &c. - -	5	0	0
Corn-bags, weights and measures, hand-hoes, riddles and other barn-looms, scythes and rakes, - - - -	20	0	0
Threshing-mill and fanners, - - -	170	0	0
Lime, 30 bolls, (180 bushels) <i>per</i> acre, at 2 s. 6 d. <i>per</i> boll, hence L. 3, 15 s. \times 300, -	1125	0	0
<hr/>			
Stock for 300 acres, -	L. 2072	8	0
for 60 acres, -	414	9	7
for one acre, -	6	18	2
<hr/>			

For this sum, an annuity of 10 *per cent.* is chargeable as in the former account, that is,

for 300 acres, -	L. 207	4	9½
for 60 acres, -	41	8	11½
for one acre, -	0	13	9½
<hr/>			

2. Annual Charges.

1 Grieve, or upper servant, - - -	L. 40	0	0
5 ploughmen at L. 35, - - -	175	0	0
1 labourer, - - - -	30	0	0
Hoeing 75 acres of turnips, 8 s. -	30	0	0
<hr/>			
Carry forward, -	L. 275	0	0
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* If one double-mould drill-plough, to which circular coulter may be added occasionally, is employed in place of these, the cost will be nearly the same; but if two are required, as will generally be the case for so large a portion of turnips, the sum charged should be doubled.

	Brought forward,	L. 275	0	0
Occasional labour,—picking weeds, stoning clover, cleaning grain, spreading dung, &c.	-	40	0	0
Wright, smith, and saddler, for repairs only,	-	42	0	0
Horses, 10, 15 quarters of oats each, - 150 1 at - - 10				
<hr/>				
	oats 160 at 25 s.	L. 200	0	0
	Grass and tares, L. 7 each,	77	0	0
	1100 stone hay at 10 d.	45	16	8
	Potatoes, yams, or Swedish turnips, 19	0	0	
			341	16 8
<hr/>				
Seed, 150 acres, 75 autumn and spring sown wheat, and 75 oats and barley, average 24 s.		180	0	0
75 acres turnips and potatoes,	-	12	0	0
75 acres clover and tares,	-	75	0	0
Mowing, &c. half of clover, 37½ at 15 s.	-	28	2	6
Harvesting, &c. 150 acres at 14 s. 6 d.	-	108	15	0
Incidental expences at markets, &c.	-	20	0	0
Insurance and repairs,	-	50	0	0
<hr/>				
Annual charges on 300 acres,	-	L. 1172	14	2
on 60 acres,	-	234	10	10
on one acre,	-	3	18	2
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3. Rent.

As land that can be profitably managed under this course is of the best quality of dry loams, the same rent may be charged, and is actually paid, as for clay-land.

4. Profits of Trade.

The amount of capital employed is as follows :

Permanent and fixed stock,	-	L. 2072	8	0
Annual expences,	-	1172	14	2
<hr/>				
Carry forward,		L. 3245	2	2

	Brought forward,	L. 3245	2	2
Soiling or pasturing, and straw-yard stock, 30 cattle				
at L. 10, or sheep of the same value,	-	300	0	0
Dang, first year, as before,	-	120	0	0
	for 300 acres,	L. 3665	2	2
which is at the rate of L. 12 : 4 : 4 <i>per</i> acre, and reckoning profits at 10 <i>per cent.</i> the sum chargeable under this head is L. 1 : 4 : 5½ <i>per</i> acre.				

The whole charges will then stand thus :

1. Permanent and fixed stock,	-	-	L. 0	13	9½
2. Annual expences,	-	-	3	18	2
3. Rent and taxes,	-	-	3	4	0
4. Profits,	-	-	1	4	5½
	Total <i>per</i> acre,		L. 9	0	5

$$L. 9 : 0 : 5 \times 4 = L. 36 \quad 1 \quad 8$$

To meet this expence there are,

* One acre of clover and rye-grass,	} average value	10	0	0
One acre of turnips,				
		L. 26	1	8

† One acre of wheat, three and a half quarters, or 28 bushels.

One half acre of barley, 22 bushels =	-	11
Ditto of oats, 26 ditto =	-	8½

Total, 47½ b. of wheat,
raised at an expence of L. 26 : 1 : 8, or 10 s. 11½d. *per* bushel.

* These crops must be valued at what they are worth to those who provide stock for consuming them, as no charge has been made, (except a very small sum for pasturing stock under the 4th head), either for that stock, or the necessary charges for sheep nets or hurdles, herd's wages, &c. Unless near large towns, the average value of the whole turnips and clover on such an extent of land cannot be rated higher than L. 5 *per* acre, whether consumed by the farmer's own stock, or let to others; which is a common practice in the case of turnips.

† It is here to be understood, that the half of the wheat is sown in autumn on clover stubbles, and the other half in spring after turnips; the remaining part

Upon the whole, it is indisputable, that, according to the present rate of labour,—of all the commodities which the cultivator must purchase,—and of rents and taxes, wheat cannot be raised upon the *best* clays and dry soils of Scotland, below 11 s., and that its cost may vary from that to 12 s. and upwards, *per* bushel, according to the greater or less fertility of the seasons. Of this the proprietor's share appears to be a little more than one-third, on an average of both kinds of soils. If this is the real cost of a bushel of wheat to the cultivator on the best soils, under all the advantages of two-horse ploughs and threshing-mills, in aid of what is found by long experience to be the most productive mode of cultivation, namely, convertible husbandry, and, on dry soils, alternate crops of grain and clover or turnips, it must be evident that the produce of inferior soils, and of all land imperfectly cultivated, or on which the labour is performed by unnecessarily expensive teams, must be obtained at a much higher rate.

Though there is much arable land in Scotland upon which wheat cannot be cultivated with advantage, yet, as the price of wheat is understood to regulate the price of all other kinds of grain, it was thought sufficient to confine these calculations to such soils as produce this crop. Where the soil and climate do not permit the growth of wheat, the expence of cultivation must render barley or big, and oats, still more unprofitable, according to the present importation rates, unless rents are very low, and the soil is enriched by long intervals of pasturage,—which, indeed, in all such situations, must ever be the primary object. — If the farmer of better soils has not a reasonable security for obtaining such prices for corn, as shall replace his expences with the fair profits of trade, he must also lay his land to grass, and leave the supply of the Bri-

of the clover stubbles to be sown with oats, and of the turnip land with barley. As the same rent is charged as for clay land, the wheat and oats are estimated to yield the same number of bushels. By this means the difference in the expence of cultivation will be more apparent.

tish market to those foreigners, who, it is well known, can raise all sorts of grain, wheat in particular, at from one-half to two-thirds of the expence that must be incurred by the British farmer. In a few years, indeed, the high price of grain, which has been the experienced result of this dangerous dependence, may tempt the British farmer again to use the plough, but from which he will soon be compelled to return to grazing;—as must be the case at the present moment, unless the importation rates are advanced nearly 50 *per cent.*; or a countervailing duty imposed on foreign grain, whenever the price of British grain is insufficient to replace the expences of production.

CHAP. XVI.

ON THE POLITICAL ECONOMY OF SCOTLAND.

BY WALTER THOM*, AND OTHERS.

INTRODUCTION.

THE science of political economy, explains the sources of the wealth and prosperity, both of individuals, and of great communities.

These sources are, 1. Land; 2. Labour; and, 3. Capital.

1. From the land, and its waters, man is furnished with the means of subsistence, and the materials of art.
2. By labour, the soil is rendered fertile, matter is fashioned into a variety of useful forms, and the waters are made subservient to the purposes of human life.
3. By capital, arising from the accumulated savings of society beyond its consumption, the agriculturist who produces, the manufacturer who fabricates, and the merchant who distributes those commodities which relieve want, and gratify desire, are enabled to accomplish objects which would otherwise exceed their power.

Land, labour, and capital, may thus be considered as the real sources of wealth. But to give them efficacy, they must mutually assist each other. For land, unless labour were

* Author of "Sketches on Political Economy," &c.

bestowed upon it, would produce few of those useful commodities, which it is capable of yielding; and labour, without the aid of capital, would be unable to accomplish many objects which are conducive to the welfare of society. Hence the wealth, and prosperity of mankind, result from the combination of these three distinct elements, and their proper application to the production of those articles which are accounted valuable.

The means of producing exchangeable commodities being once discovered, man is enabled to augment their quantity, and to ameliorate their quality, by applying his intellectual and physical energies, to the improvement of agriculture, manufactures and commerce.

1. The art of agriculture is improved, by his knowledge of the principles of vegetation, and by the construction of useful machines.
2. Manufactures are improved, by his scientific knowledge—his inventive faculties—the application of machinery—and the division of labour; and
3. Commerce is extended, by the facilities it receives through the speedy conveyance of merchandise, and the introduction of an agent of exchange, whether coin or paper, which has become the representative of value.

By these three modes of employing human industry, the comforts and luxuries, as well as the necessaries of life, are procured, and the condition of mankind has been greatly ameliorated.

The productive powers of agriculture, manufactures, and commerce, depend, however, upon the encouragement they receive :

1. From the facilities afforded for conducting their operations; and,
2. From the extent of the demand for what they produce.

These important objects are best attained by a ready internal communication, through the means of roads, bridges, navigable canals, or railways; and by an open and safe external conveyance, through the art of navigation. Raw materials, and manufactured commodities, are thus transported from one place to another, and new markets are opened for the sale of commodities. The spare produce of the labour of one individual, or of one nation, is thus exchanged for that of another individual or of another nation; the sphere of human action is enlarged; and countries remote from each other, become connected by reciprocity of interest.

It is not proposed, within the narrow limits of the chapter of an extensive work, to attempt laying down any regular system of political economy, the object of this chapter being, to furnish the intelligent inquirer, with materials that may assist him in forming such a system*. For that purpose, it is proposed to consider the state of Scotland, with reference to the following important particulars;

1. Manufactures; 2. Commerce; 3. Fisheries; 4. Roads, bridges, canals, and railways; 5. Weights, measures, fiars of grain, and assize of bread; 6. Fairs and markets; 7. Price of labour and provisions, and the state of the corn-laws; 8. The situation of the necessitous poor, and the laws regarding them; and, 9. The present state of the population of Scotland.

These details comprehend, not only the objects of industry, but also the means by which they are encouraged and extended.

* In the Appendix, NO. I. will be found, an able paper, written by the Reverend Charles Findlater, minister of Newlands in Peebles-shire, containing some ingenious philosophic discussions on the subject of political economy.

SECT. I.

MANUFACTURES.

THIS important branch of the present inquiry, will embrace the fabrication of a great variety of articles; and will display, in a striking point of view, the great extent and value, which the manufacturing industry of the people in Scotland, has attained. Until a late period, manufactures were, comparatively speaking, but little known in that country; but since the Union between the two kingdoms, several branches have been brought to a high degree of improvement; and extensive markets have been opened, both at home and abroad, to the spirit and enterprise of the Scotch manufacturers.

The manufactures carried on in Scotland, may be classed under two distinct heads:

1. *The Primary* or most important, which require much machinery, and employ great numbers of people; and, 2. *The Secondary*, which in both these respects are inferior.

The first head comprehends, 1. The woollen; 2. The linen; and, 3. The cotton.

The second, (including some of the chief branches of the mechanic arts), contains a variety of articles; as, 1. Silk; 2. Calico-printing, &c.; 3. Hats; 4. Paper; 5. Iron; 6. Copper, lead, and tin; 7. Wood; 8. Tanning; 9. Breweries and distilleries; 10. Sugar refining; 11. Pottery; 12. Glass; 13. Soap, candles and starch; 14. Culinary salt; 15. Tobacco and snuff; 16. Combs and spoons; 17. Coal, lime, and marble, as connected with manufactures; and, 18. A number of miscellaneous particulars.

An account of the origin, progress, and present state of

these several branches of industry, will be found in the Appendix *.

1. WOOLLEN.

This species of manufacture, the most ancient known in Scotland, consists of four principal divisions: 1. *Spinning*, or the conversion of the raw material into yarn; 2. *Weaving*, or the manufacture of yarn into cloth, blankets, carpets, &c. 3. *Knitting*, or the manufacture of yarn into stockings, gloves, pantaloons, &c.; and 4. *Felting*, or the making of woollen hats.

1. *Spinning*.—Some attempts were made, before the two crowns were united, to establish the woollen manufacture in Scotland on a regular footing; and experienced workmen were accordingly brought for that purpose, from different parts of Europe. But these attempts failed, and the trade gradually reverted to its former narrow limits, when the woollen cloths made in Scotland were chiefly manufactured by the extra labour of those who were employed in husbandry.

The females, especially in winter, were occupied in carding and spinning the wool. The yarn thus produced, was either given to a country weaver, to be woven into cloth for family use, or sold to such dealers as frequented fairs, where the surplus of both cloth and yarn was exposed to sale. This mode of manufacturing woollen yarn and cloth, is not yet entirely abandoned, although now principally confined to the Highlands and poorer districts of the country.

Before the introduction of machinery for spinning wool, the process was performed in two ways; 1. By the large wheel, of one spynkle, driven by the hand; and 2. By the small wheel, of one or two spynkles, driven by the foot, after the wool had been prepared by the hand-card, or combed. Wool-combing was once a considerable branch of this manufacture; but it is now almost entirely superseded by carding machines.

* See the Appendix, NO. 11.

Mr Baird of Aberdeen was certainly among the first, who introduced machinery in the manufacture of wool in Scotland. In 1789, he brought from Rochdale two carding engines, and four spinning-jennies, with the other necessary apparatus. That part of the machinery which required the power of water was erected at Stoneywood, on the river Don; but the jennies, with the looms, &c. were erected at Aberdeen. About 600 lbs. of wool were manufactured weekly, until the year 1796, when the machinery was increased to twice the extent. The preparation of wool by hand was generally laid aside, and several other mills were erected in Aberdeenshire; so that, in 1799, about 4000 lbs. were weekly manufactured by 18 engines. So rapid, indeed, has been the increase of this manufacture, that mills have been erected, not only in the different parts of Aberdeenshire, but at Elgin, Forres, Inverness, Cromarty, in Caithness, and in some of the southern and western counties of Scotland*. But the most considerable work of this kind in Scotland is, that of Messrs Hadden and Company at Aberdeen, which extends to 20 machines, wrought by two powerful steam engines.

2. *Weaving*.—In Scotland, the manufacture of woollen cloth was formerly confined to coarse fabrics; every attempt to produce a fine quality, on equal terms with the English having failed; and as far back as 150 years ago, a species of cloth termed *fingrams*, was made at Aberdeen for the foreign market: but the general manufacture of the country was seys and serges for home consumption. Since the introduction of machinery, however, superfine broad cloths, equal to the best made in England, are manufactured in Scotland, particularly at Cothal-Mills, in the parish of Fintray; at Kinmundy, in the parish of Longside; and at Peterhead, in

* At many of these mills, the country people get wool teased and carded, at so much *per stone*, which they spin at home; or it may be spun by the machinery, and returned in the state of yarn.

Aberdeenshire, the greater part of which is sent to the London market. But the prevailing manufacture still consists of coarse articles, such as narrow cloths, duffles, plaidings, blanketings, checks, flannels, seys, and serges, either for home sale, or exportation. These articles are chiefly made in the shires of Aberdeen, Inverness, Argyle, Perth, the Lothians, Ayr, Peebles, Selkirk, and Roxburgh. Tartans of various kinds are principally fabricated in the counties of Stirling, Argyle, and Inverness; and coarse cloths and blankets, for family use, are made in most parts of Scotland. But this branch of the woollen manufacture is now much limited, owing to the preference given to English blankets, which, from their lighter texture, afford a more comfortable covering.

Carpets.—This branch of the woollen manufacture is carried on to a considerable extent, but principally confined to coarse sorts; for those made in imitation of Turkey or Wilton carpets are not attempted. This manufacture is conducted chiefly at Aberdeen, Kilmarnock, Stirling, Bannockburn, and Hawick. A few are also made at Glasgow, Leith, and in the county of Haddington. The spinning, dying, and weaving departments, are carried on at the respective manufactories. There are between 400 and 500 weavers of this article in Scotland, about 130 of whom are in Kilmarnock alone. A man weaves about six yards *per* day, and receives from 3½d. to 4½d. *per* yard. The selling prices run from 2s. 9d. to 3s. 9d. *per* yard. A considerable quantity of carpeting was sent to the United States; but since the commencement of the war, the exportation of that article has declined, and the principal markets are now London and Dublin, with Edinburgh, and the other towns of Scotland.

3. *Knitting.*—The knitting of stockings forms, in many parts of Scotland, a domestic manufacture. It was formerly carried on to a considerable extent, particularly in Aberdeenshire, whence great quantities of stockings were exported to America, Holland, the Netherlands, and the north of

Germany. The French revolutionary war almost ruined this trade to the European Continent. But the hosiery manufacture has been revived in a different and improved state, in consequence of the introduction of machinery for spinning the yarn; and it is now carried on, including all its branches, to a greater extent than at any former period.

Stockings.—Stockings are either knit by wires, or wrought by frames. The former kind are preferred to the latter, as being more durable. The statute Geo. I, c. 18, ordains, that all stockings shall be made of three threads; but this regulation is not strictly adhered to, particularly in frame-work; and stockings are frequently made of only two, and even of one thread. The latter are denominated “yarn-hose.” The manufacturers in the northern districts, employ women chiefly to knit their stockings, at a certain rate *per* pair; and in general, the quality is coarse, the price of the article when finished being only from 10 s. to 40 s. *per* dozen. The making of breeches and pantaloon-pieces has become a considerable and increasing branch of the hosiery trade.

Lamb-Wool Hosiery.—This branch of the stocking manufacture was only introduced about thirty years ago. The yarn is made of the short wool of lambs, carded by machinery, and spun on wheels resembling the common cotton-jennies. It is soft and oozy, which constitute its principal property; as being elastic and spongy, it forms an agreeable and warm covering. This manufacture is carried on chiefly in the southern counties—about Hawick, Jedburgh, Galashiels, Selkirk, Peebles, and Dumfries. At these places, the scribbling and carding machines are driven by water, but the roving and spinning processes are performed by jennies, wrought by hand. This branch is also carried on to considerable extent at Glasgow and Edinburgh, and in their vicinity. The power of steam is applied to drive the machinery, and not only the teasers and cards, but the jennies, reels, and twisting machines, are moved by this power. The number of frames at work, on lamb-wool stockings, breeches,

and pantaloon-pieces, in the southern districts of Scotland, is from 700 to 750. Those in and near Edinburgh amount to about 150: and at Glasgow, and the adjacent towns and villages, to about 200. After the lamb-wool hosiery is woven, it generally receives a small degree of wauking and scouring; and the undyed articles are subjected to the fumigation of burning sulphur, which, by destroying the yellow tinge of the wool, makes the white much more pure.

Zetland Hosiery.—In the Orkney and Zetland Isles, the knitting of stockings, or as they are locally termed Hose, is a source of considerable advantage to the inhabitants. Both the finest and coarsest wool is obtained from the same fleece; and so great is the difference of quality, that stockings made of the best wool, are sold for 30 s. the pair and upwards; whilst those made of the worst, are worth only 4 d. or 5 d.; but they may be had at every intermediate price. The proportion of fine wool varies from the 30th to the 73d part of the fleeces. The greater part of the stockings and mitts manufactured in these islands, is sent to the different towns on the east coast of Scotland, in exchange for groceries and other commodities.

4. *Felting.*—In Scotland, bonnets were formerly much used, not only in the Highlands, but also by the lower classes in other parts of the kingdom; and they are still considered as a most essential part of the Highland military garb. But the refinement of the times has found a substitute in hats, which even among the poorer people have almost everywhere supplanted bonnets. Besides the hats made for home consumption, considerable quantities of a coarse quality for negroes, &c. are exported to the West Indies.

The above-mentioned manufactures are the principal branches of the woollen trade carried on in Scotland. Considerable quantities of long or combing wool are imported. In regard to the short or clothing wool, the manufactures above described do not nearly exhaust the raw materials produced in

the country: and great quantities of that description of wool, are purchased by agents for the manufactories in England.

II. LINEN.

The manufactures of flax and hemp are deemed objects of great national importance, and have long received the fostering protection of Government. "An act for better regulation of the linen and hempen manufactures of that part of Great Britain called Scotland," was passed in 1727 *. In consequence of that statute, a board of trustees was established in Edinburgh "for overseeing, directing, and better improving the said linen and hempen manufactures," on which extensive powers were conferred. This board has since continued in constant activity, and regulated the trade in all its branches—from the sowing of the flax-seed, to the measuring and finishing of the bleached cloth.

The linen and hempen manufactures are divided into various branches, which are carried on either separately or in combination. The linen branches are as follow: 1. Spinning; 2. Weaving the yarn into a great variety of fabrics; and, 3. Thread-making, both coloured and white, or the twisting of yarn into a slender twine, for the purpose of sewing, making fringes, net-work, &c. The subsidiary operations required to complete these branches, are also distinct operations, such as flax-dressing or heckling, bleaching and dying, callandering, lapping, &c.

1. *Spinning*.—In Scotland anciently, yarn was spun by the distaff, or rock and spyndle, as practised by the ancient Greeks. This method was superseded by the introduction of the common wheel, which at first had only one spyndle, but about sixty years ago, was improved by the addition of another. This wheel is to be found in almost every family in Scotland: the higher classes of females, formerly amused themselves with this occupation; and spinning was then considered to be a

* 1^o. Geo. I, c. 25.

profitable employment to the females of the lower class, though much less so at the rate now usually given. A third mode of spinning has lately been invented, and machinery, on the principle of the cotton-mill, is now much employed, especially for spinning the coarser kinds of yarn, or such as are fit for dowlas, canvas, and threads.

1. *Hand-Spinning*, or that by the Common Wheel.

This branch is carried to great extent in the shires of Perth, Angus, Mearns, Aberdeen, the northern counties, and in Orkney. The flax, after being dressed, is given out by agents in the country to the females, who spin it at a certain rate *per* spyndle. The yarn is either manufactured in the neighbouring towns and villages into cloth and threads, or it is sent to the different markets in the south of Scotland, and also to those in England, for a similar purpose. The county of Aberdeen is the chief seat of this branch, which rose proportionally as the stocking manufacture declined.

2. *Mill-Spinning*, or Spinning by machinery.

This mode was introduced in the year 1790, the first flax mill in Scotland having been then erected at Inverbervie in Kincardineshire. It has now become an important branch of the linen manufacture, and employs an immense capital. These mills are general in Aberdeenshire and the Mearns, and the shires of Fife and Angus, (where forty-four mills are employed); there are several also in the more southern counties. But the most extensive in Britain, is situated at Grandholme, on the Don, about two miles from Aberdeen. The whole extent of the spinning machinery in Scotland may be estimated at 30,000 spyndles; and supposing these to be in full employment, they will spin 2,600,000 spyndles of yarn annually; and calculating the same number to be spun by the hand-wheel, the total amount of this manufacture in Scotland will be about 5,200,000 spyndles.

Although the yarn spun by machinery be strong and even, yet it cannot be made of so fine a quality as to suit the lighter fabrics of the linen manufacture, and therefore the use of

the common wheel must be continued. Machinery, however, possesses several advantages over hand-spinning. It is driven by water or steam, and the whole manufactory may be contained in one house, where the dressing and spinning of the flax, with the weaving or twisting of the yarn, may at the same time be conducted. All the operations required to bring the raw material to a finished state, are thus placed under the immediate inspection of the master, who, besides, receives a quicker return for the capital invested, than when he resorts to hand-spinning, which is both more tedious and expensive. Not only the dressed flax, but the tow or refuse, and also hemp and hempen tow, are spun by machinery, adapted respectively to the nature of the different materials. So various and important, indeed, is the power of mechanism, that the invention of mills may be deemed a new era in the linen manufacture.

The yarn produced by the spinning-mills is partly manufactured into threads, shirtings, ticks, checks, sail-cloth, Osnaburghs, &c. in Scotland, and partly sent to the markets of England for similar purposes. It is made up in small bundles, denominated spyndles, regulated as to length and number of threads by act of Parliament*. Each spyndle contains four hanks, and each hank 12 cuts of 120 threads 90 inches in length.

2. *Linen Cloth.*—Since the year 1727, the progress and extent of the linen cloth manufacture in Scotland, may be known with tolerable accuracy, by the returns of the stamp-masters to the Board of Trustees. It appears, that in 1728, there were stamped 2,183,978 yards, value L. 103,312 : 9 : 3 Sterling, and that the trade has gradually increased since that period, the quantity stamped in 1812, being 18,975,862 yards, amounting to L. 1,020,493 : 11 : 2½ Sterling. It is also evident from the returns, that the average value of th

* 3. Geo. I, c. 25.

loth, during that period, has not varied more than fourpence sterling *per* yard, being, from the years 1734 to 1747, and also in 1793, under ninepence; and since 1793, the average price has very seldom exceeded one shilling *per* yard. But the cause of apparent equality of price is, that except by private families, very little fine cloth is now manufactured, having been supplanted by the substitution of cotton goods, and the importation of Irish cloth. There is, however, still a quantity made by private families for domestic use; but as the law does not require it to be stamped, it is not included in the reports of the officers of the board. There is also an inconsiderable quantity made for sale in the northern and western counties. The manufacture of middling qualities of linen cloth, has also greatly decreased. At Aberdeen, for instance, it appears that 38,780 $\frac{1}{4}$ yards of bleached cloth, value 2s. *per* yard, were stamped in the month of December 1811; but in October the following year, 11,619 yards only were stamped, and since that time the quantity has considerably diminished. When Dutch flax, however, can again be obtained, the manufacture will revive.

The linen manufacture of Scotland, is, therefore, at present, nearly confined to coarse articles, such as plain sheetings, Osnaburghs, bagging, and canvas. The three first are principally exported to the West Indies and to America; and the last is a war article, of which the royal navy requires a great quantity.

1. Sheetings, Osnaburghs, bagging, and canvas, are chiefly made in Forfarshire. The manufactures in this district had extended to upwards of 11 $\frac{1}{2}$ millions of yards in the year 1812, worth more than L. 540,000 Sterling; but, at the same time, of such coarse fabrics, as to average something less than one shilling *per* yard.

2. The same species of goods is also made in Fife, and in 1812, the quantity of cloth stamped of every description exceeded 4 $\frac{1}{2}$ millions of yards, averaging 14 $\frac{1}{4}$ d. *per* yard, and amounting in value to L. 280,000 Sterling. In that county,

tional importance. The trade, owing to the war, and the extension of the cotton manufacture, has certainly declined, the quantity stamped in 1810 having exceeded that of 1812 nearly seven and a half millions of yards. The recent introduction, however, of weaving machinery, or what are termed *Power-looms*, may perhaps give fresh vigour to the linen trade.

3. *Threads*.—The linen-thread manufacture was introduced into Scotland about the year 1720, and has been since carried on to a great extent in the counties of Aberdeen, Angus, Fife, Perth, Renfrew, Lanark, Mearns, Banff, Moray, and Inverness. This manufacture is divided into two distinct branches: 1. Coloured, or Dyed.—2. White, or Bleached, which are carried on, either separately, or united in one manufactory.

1. The process of making coloured threads, consists in twisting the yarn on a machine of a circular form, with vertical spindles, driven by a belt of leather. The threads are twisted, and reeled at the same time, in hanks or skeins of twelve threads, 60 inches in length. They are then given to the dyer; and when coloured, are subjected to various processes, which render them fit for sewing. The fineness of the threads is denoted by the number of hanks in the pound weight; and it is accordingly marked on the wrapper, No. 8, 10, 12, &c. as it may happen; from which the purchaser understands, that the pound contains 100, 125, or 150 hanks—rising 25 for every two numbers up to 20, which is the finest denomination of coloured threads.

2. White or Bleached Threads, termed Nuns or Ounce-Threads, are first slackly twisted, and then partly bleached; afterwards, they are fully twisted, and then completely bleached. An act of Parliament was passed in the year 1788, regulating the length of the reel, (36 inches), and the number of threads (30) in each hank. The fineness of the threads is denoted by the number of hanks in the ounce—which is written or printed on the packages.

These branches were of great national importance, from the employment afforded to a number of females, and poor people. Their principal seat was in the city of Aberdeen, where 500,000 spyndles of yarn were annually manufactured into threads. Of late years, however, this, and the preceding branch have so much declined, that they can scarcely be said now to exist in Scotland, and there is unfortunately no prospect of their revival. Indeed, since the invention of flax spinning-mills, Mr Marishall of Leeds began the manufacture of coloured threads, from yarn made by machinery, which is stronger and more level than that spun by the hand; and, consequently, the threads being of a better quality, are preferred in the market. These threads are known by the title of 'patent;' and having deservedly obtained the favourable opinion of the consumers, the Scotch manufacturers are unable to produce an article that can stand in competition even in the markets of their own country. But the great cause of the decline of this manufacture, is the introduction of cotton threads, which are now in general use, for almost every purpose to which the others were applied.

Beat Threads.—A large quantity of linen threads is also used in sewing and ornamenting cotton goods of various descriptions. The threads are softly twisted, and glossy. They are known by the name of Beat Threads, from having been beetled to increase their pliancy. Muslins, thus ornamented, are not exempted from convoy duty, like goods fabricated wholly of cotton; and this circumstance operates powerfully against the use of beat thread, not so much on account of the tax itself, as for the trouble of making the proper distinction, which, if not accurately done, subjects the whole package to customhouse seizure.

Heddles.—A considerable quantity of linen yarn is still annually made into twine for weavers' heddles; and although these utensils be sometimes made of cotton, woollen, and silk, yet from 35 to 40,000 weavers in Scotland consume flax for that purpose.

Viewing the linen thread manufacture as one great branch of local industry which Scotland enjoyed, it is to be regretted that it should have so much declined. But when we reflect, that it has been supplanted chiefly by cotton threads, the raw material of which is the produce of our own colonies; and that both the soil and climate of this part of the kingdom, are not, in general, favourable to the growth of flax, the loss of this manufacture is less an object of regret, than if it had originated from causes affecting the general prosperity of the empire. The principal circumstance which rendered this branch of value, was the circulation of money paid for spinning the yarn among the females and poorer classes of the community, who, in the northern counties, from the failure both of this, and of the stocking manufacture, are at present in great distress*.

The total value of the linen manufacture of Scotland may be estimated for the year 1812, at about L. 1,775,000 Sterling, allowing L. 1,400,000 for cloth †, and L. 375,000 for all the other branches, including the yarn exported to England, and also the hemp employed in the fabrication of cloth.

* Mr Lee of Enfield Wash, near London, has lately made an important discovery in the preparation of flax and hemp, by which the process of steeping is avoided, and the fibre is preserved entire, and has given in proposals for establishing it in Scotland. The finest quality of flax he produces is similar in strength and appearance to silk, and it is supposed may be applied to every purpose for which silk is adapted. This discovery may be the means of reviving the linen manufacture of Scotland, or, at any rate, it will afford facilities for the introduction of new branches, and may ultimately be of the greatest national importance.

† See Appendix, NO. III, for an account of the cloth stamped in Scotland since the commencement of the Board of Trustees to the year 1813.

HEMP.

The manufactures of flax and hemp are always united in acts for their regulation. In regard to hemp, the markets of Scotland are almost entirely supplied with that article from foreign countries, especially from Russia, the quantity raised in Britain being very inconsiderable. Hemp is easily bleached, and its colour is superior in brightness to that of flax. It is also less liable to injury in salt water than flax, and possesses many advantages to recommend it to general notice.

The hemp manufacture consists of three branches: 1. Spinning; 2. Weaving, or the manufacture of canvas and bagging; 3. Rope-making, which includes twine for cording, nets, ropes, cables, &c.

1. *Yarn*.—It is spun into yarn, either by the common wheel, by machinery, or by the shed wheel, and the last is deemed the best mode, when applied to make ropes and the woof of canvas.

2. *Cloth*.—Hemp yarn generally forms the woof of sail-cloth, and many kinds of bagging are entirely constituted of it. The manufacture of hemp-bagging is carried to a great extent at Inverness, Cromarty, and Invergordon in Ross-shire, and also at Aberdeen, Montrose, Arbroath, Dundee, and in many other places in Scotland.

3. *Ropes, cordage, &c.*—Manufactories of ropes and cordage are established at every sea-port along the eastern and western coasts of Scotland; and employ about 1000 men and boys. In the neighbourhood of the large towns there are many rope-walks for making twine and cording for mercantile packages, and also ropes for agricultural purposes. The consumption of these articles by merchants, farmers, carriers, &c. is very considerable; but the most extensive application of hemp is in the manufacture of cordage.

The total quantity of flax and hemp imported into Scotland for the year 1812, was as follows:—

FLAX.

Tons.	cwt.	qrs.	lbs.	
6,094	4	2	18	at L. 100 per ton, is L. 609,430 16 0½

HEMP.

2,496	17	1	18	at L. 90 per ton, is	224,718	6	0½
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8,591	2	0	8	amounting to	L. 834,149	3	0½
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Such a sum, however, paid for the importation of the raw material to foreign nations, greatly diminishes the value of the flax and hemp manufactures, in a national point of view.

III. COTTON.

About the year 1769, cotton was introduced into Scotland as a material for the fabrication of cloth. It was used at first as wool only, the warp being linen yarn. The fabrics thus produced were stout chequered and striped goods, and also plain cloth, which was either printed or dyed.

The cotton manufacture consists of three branches: 1. Spinning; 2. Weaving the yarn into a great variety of fabrics; 3. Thread making.

1. *Spinning*.—The operation of spinning was originally performed on jennies, consisting at first of from 24 to 28 spindles each, and the yarn produced was of a soft oozy nature, unfit for warps, but well calculated for calicoes, fustians, corduroys, and other stout fabrics. But by the improvements in machinery, cotton yarn can now be made of so fine a quality, that a pound weight will extend nearly 150 miles in length, and, consequently, goods of every texture, from the coarsest corduroys, to the finest lace, can be made of cotton.

2. *Cloth*.—While the English manufacturer made for the market, the coarser kinds of cloth, such as calicoes, jeans, fustians, thicksets, corduroys, shirtings, &c. the Scotch directed their attention to the finer qualities. Mull-mulls, and bawe or book-muslins were soon very perfectly executed. To these have been added brocades, lappets of all sorts, imita-

tion shawls, plain and Linoe gauzes, spidered, seeded, and numerous species of draw-loom, and other work of the most fanciful, delicate, and ornamental kinds. Many of these fabrics, with the curious mechanism by which they are executed, are exclusively of Scottish invention. Immense quantities of cambrics, shirtings, sheetings, tweels, stripes, checks, pulicates, gingham, shawls, &c. are manufactured in Scotland in a superior manner.

3. *Threads.*—Within these few years a new species of this article has been introduced, which, succeeding beyond expectation, has almost entirely supplanted linen sewing threads. The method of making them is similar to that employed for manufacturing threads of flax. The yarn is laid two or three ply, and twisted. The twisting process is performed either on a jenny fitted up for the purpose, or on the old Dutch mill. The threads are either bleached or dyed; and sold in hanks, or coiled up in neat balls of different sizes by an ingenious machine. From the nature of cotton it is more easily bleached and dyed than flax, and the colours it receives by dying, are generally brighter and more beautiful.

Cotton threads are now in general use, and being strong and even, they are fit for every purpose, with few exceptions, to which linen threads could be applied, and they are also cheaper. They have obtained the name of wire threads, and they form an article of profitable exportation to the West Indies and other parts. The total quantity manufactured in Scotland amounts to about 560,000 lbs. of the estimated value of L. 196,000 Sterling.

4. *Hosiery.*—The whole number of stocking-frames employed in Scotland does not exceed two thousand, and the value of the goods is about L. 160,000 annually. The weekly wages of a weaver in this branch are, on an average, about 18 s. 6 d.; but, when the frame is not his own, which is often the case, he has to pay 1 s. a-week for the use of it.

COTTON MACHINERY.

To present a satisfactory view of the cotton manufacture, either in regard to the variety of its fabrics, or the extent to which it is carried, it is necessary to notice, in a particular manner, those mechanical inventions which have contributed so much to its improvement, that it may be said to be entirely dependent on machinery. In tracing the progress of these, from their rude to their present highly improved state, we shall discover the causes of the vast increase of this manufacture, with the endless variety of its products, and also ascertain the stations in Scotland where it is most extensively conducted.

Its early state.—The machinery for carding, roving, and spinning, was at first extremely imperfect, and was wrought by the hand. Better constructed machines, however, were soon introduced, and the power of a water-wheel was applied to the processes of carding and roving. The spinning was performed on jennies, consisting at first of from 24 to 28 spyndles each, but subsequently increased to 84, 96, 108, and even 120; and the yarn was fit only for the coarsest fabrics.

Arkwright's invention.—The next improvement of spinning machinery was Arkwright's water-frame*, by which that particular kind of yarn, termed *engine* or *water-twist* is produced. This sort of yarn possesses great strength; but when drawn to any considerable degree of fineness, the hardness of the twisting renders it liable to what is technically called snarling, which makes it difficult to manage in the loom. Hence this kind of yarn is seldom spun finer than NO. 50 or 60, which denotes that one pound avoirdupois contains so many hanks of 840 yards in length, as the numbers respectively express.

* Arkwright obtained his first patent for spinning by means of rollers in the year 1769. His first mill was erected at Nottingham, and driven by horses; but this mode, being found too expensive, a larger mill driven by water was erected at Cromford in Derbyshire in the year 1771.

Crompton's invention.—The engine or water-twist being found too hard when drawn to great fineness, and the common jenny-yarn being too soft for clear and wiry fabrics, a combination of these respective qualities was desirable. To obtain this object, Mr Crompton invented a machine, denominated the *mule-jenny* * in the year 1779. This machine is so perfect, that cotton of a good quality may be drawn to the fineness of 200 hanks in the pound weight. Some of it, indeed, is spun so fine as 312, or nearly 149 miles in length †. This quality, however, is chiefly made in England, to be twisted into threads for Nottingham lace. In Scotland, very little yarn is spun finer than 160 or 170, and the average of the whole by weight, is about NO. 48.

Arkwright's water-mill, and Crompton's mule-jenny, are the two great inventions in cotton machinery, which have brought this manufacture to so high a state of improvement.

Erection of Mills.—Soon after the invention of Sir Richard Arkwright's machinery, the Scots entered keenly into the cotton manufacture, and water-mills were erected in many different situations ‡. The first regularly at work was that at Pennycuik near Edinburgh, and those at Barrhead and Johnstone in Renfrewshire: Woodside in Lanarkshire, Paisley in Aberdeenshire, and the very extensive works of the late Mr Dale of Glasgow soon followed. Owing to the difficulty of obtaining water-falls of sufficient power, mills were erected in situations not well adapted for conducting the business; and the proprietors were often subjected to much inconvenience, as well as great expence, in regard to car-

* The term *mule* seems to be derived from the circumstance of two machines then in use being combined.

† An instance is mentioned where one pound of fine cotton was spun by the mule-jenny into 350 hanks, forming a thread of 167 miles in length.

‡ The first cotton spun by water in Scotland, was at Rothesay in Bute, but it was only an experimental trial in a lint-mill.

riages, &c.; and in building houses for the accommodation of their workmen. These inconveniences, however, were in a great measure obviated by the introduction of steam-engines, which are now advantageously employed as a moving power, especially in those districts where coal abounds. In consequence of this important discovery, the number of cotton-mills greatly increased, and altogether, 120 have been erected in Scotland, of which 112 are at present employed, besides several small works, in different parts of the country, comparatively speaking of little importance.

Fly-shuttle.—The introduction and general use of the fly-shuttle, have greatly tended to promote the cotton manufacture, by facilitating the operation of weaving. Previously to this improvement, the weaver pitched his shuttle from one hand to the other, being obliged to catch hold of it every time it passed through the web, which was, especially in broad work, a tedious and laborious exertion. Now, however, he has seldom occasion to touch it, except in filling; as the boxes fixed at the end of his lay, alternately receive and discharge it by a driver, to which motion is communicated from the weaver's hand by means of a string. In weaving chequered goods, there are extra boxes, which, by simple mechanical contrivances, shift and shoot different shuttles containing respectively such kinds of weft as the pattern may happen to require. This improvement rendered the loom a more complete machine, and the weaving of fine goods was brought to the highest perfection. Calico-printers, however, and those who manufactured low-priced articles, found it difficult to obtain weavers for coarse fabrics, owing to the great encouragement afforded for weaving fine goods, and necessity therefore prompted, as a remedy for the scarcity of hands, the substitution of machinery for manual labour.

Power-looms.—The first attempts in Scotland to apply the power-loom to practical utility, in any regular and extensive scale, were made at Milntown printfield in Dunbartonshire. They were introduced at Stockport in England at nearly the

same time. These machines were, at first, very imperfect; and although only coarse goods can as yet be woven on them, there is still every reason to expect, that, in time, they may be made to answer for weaving fine fabrics*.

Number in Scotland.—There are 234 power-loom^s at Carrine in Ayrshire, on many of which, excellent tweeled cottons for shirtings, &c. are woven; but power-loom^s in general are employed to weave plain cloths for printing. Several large manufactories are fitting up at present for the reception of about 500 of these machines in Lanarkshire, &c. and 1500 are working in Scotland, chiefly in Dunbartonshire, Stirlingshire, Ayrshire, Renfrewshire, and Lanarkshire. There are also 16 of these looms of the most elegant mechanism working at Grandholme mill, near Aberdeen. These looms have been successfully employed in weaving both woollen and linen cloth as well as cotton, but the last material affords facilities for working superior to the others.

Driven by water or steam, and the advantages they possess.—These machines are driven by a water-wheel, or a steam-engine, and from 10 to 20, according to circumstances, may be wrought by one horse power. The frame and other parts are constructed of cast iron, which is better, and ultimately cheaper than wood. The advantage they possess over the common loom, may be estimated at about 20 *per cent.* on the amount of weaving, and from 6 to 10 *per cent.* on the value of the goods; but they are as yet only adapted to the weaving of coarse fabrics.

Dressing machinery.—Preparatory to weaving cotton or linen yarn, it is requisite to dress the warp of the web with starch or some other glutinous substance to smooth its surface, that it may pass easily through the heddles and reed. This operation was formerly performed by the weaver, with

* A patent power-loom, constructed by an Englishman, was some years ago brought into partial use in Glasgow. In it the web is woven vertically instead of horizontally, as in other looms, consequently it occupies smaller space.

two brushes charged with the starching material. But this mode was found particularly inconvenient in weaving by the power-loom. Hence dressing machines were constructed, consisting of two cylinders, in length equal to the breadth of the web; the surface of each being set with bristles forming a brush. These cylindrical brushes dress the warp in revolving as it passes slowly along their surface. The warp is afterwards dried by one or more revolving fanners, driven by the same power that moves the cylinders and the other parts of the apparatus. Dressing machines, however, have made but little progress, there being not more than 60 or 70 employed in Scotland.

Winding-machines.—This operation consists in winding the cotton from the cope, preparatory to being warped. The cope is the yarn coiled up in a conical form as it comes from the spindle of the mule-jenny. Winding-machines were recently introduced. Each contains from 20 to 144 spindles, on every one of which, there is a bobbin that winds the yarn from the cope.

Tambouring-machinery.—The flower and tambour-work of Flanders was successfully imitated in Scotland; and a great manufacture was quickly established, which flourished beyond expectation. Although still carried on to considerable extent, it has in a great measure given place to hand-sewing, which is applied in every way that fanciful ingenuity can devise. Satin, chain, seed, bead, open, and a variety of other stitches are performed with coloured and white cotton, linen, and silk; and also with coloured worsted, gold and silver thread, spangles, &c. &c. About twelve years ago, a successful attempt was made at Glasgow to tambour muslin by machinery, for which the inventor obtained a patent. A manufactory was then established; and at present there are sixteen frames in full employment. Twelve of them having each 54 needles, one inch asunder, tambour 6-4ths muslins; the other four, with 100 needles each, 3-4ths of an inch asunder, are intended for either 8-4ths muslins, or two webs of

4-4ths each. The whole are wrought by power from a steam engine; and a female attends each, who performs as much work as eighteen girls could accomplish by hand sewing.

Singeing-machine.—Some kinds of cotton cloth, before bleaching, are subjected to the process of singeing. The machine employed for this purpose consists of two cylinders, with a handle on the end of each; and they are placed eight or ten feet asunder; the one receives the cloth, while the other delivers it, and *vice versa*. A furnace, surmounted by a cast-iron plate, about eight or ten inches broad, and six or eight feet long, is placed between the cylinders. When the fire in the furnace brings the metal to a red heat, the cloth is wound from one cylinder to another, and both sides of it are alternately passed on the surface of the heated plate. All the oozy fibres of the cotton are thus burnt off, and the cloth is rendered quite bare and smooth. The art of muslin singeing is carried on as a separate business, and the usual price is about a penny for each piece.

Improved Callender.—This machine was introduced at Glasgow some years ago, under a patent. It consists of two rollers, between which the cloth is passed; and as the one revolves quicker than the other, a fine polish is produced on the surface of the web. This machine is capable of glazing about 100 pieces of 28 yards each *per* day; and the work gives satisfaction to the exporting merchant, both from its quality, and the ease with which, in cases of emergency, he can complete his shipments. The common callender is also used for this purpose. It was formerly heated by pieces of hot iron, thrust into the hollow metal cylinders; but of late years steam has been successfully applied, and this heat is both more regular and less troublesome than the other.

Beetling-machine.—The most approved gloss for cambrics and sheetings is given by beetling, which was formerly performed by muscular power. The process, however, is now much better accomplished by a machine, which consists of a horizontal cylinder, and twelve or more beetles.

Pressing-machines.—After they have been finished and folded, they are subjected to pressure, more or less, according to circumstances. Presses with an iron-screw, wrought by levers, are generally used. Several of Braham's aquatic presses were lately introduced for this purpose, and have given much satisfaction; but the number in Scotland does not exceed twenty.

With machinery so highly improved as that which we have noticed, in regard to spinning, weaving, and other succeeding operations, it was to be expected that the cotton manufacture would be carried to the highest pitch of improvement. Accordingly, every variety of goods is made in Scotland, from the coarsest to the finest fabrics; and while the annual value of the cotton manufacture exceeds six millions sterling, it gives employment to 150,000 men, women and children*. A general view of these important particulars is given in the following tables.

* In the Appendix, NO. IV, some additional particulars regarding the cotton manufacture will be given.

TABLE I.

OF THE NUMBER OF PERSONS EMPLOYED IN THE COTTON
TRADE OF SCOTLAND.

	Men.	Women and Children.	Total.
<p>spinners, &c. There are a few odd thou- sands more than 900,000 spindles, presently in Scotland. Of these, nearly 100,000 are for water; the rest for mule twist. When a mill is established on the most improved plan, one person is necessary for every 100 spindles. Many of the mills, however, be- ing old-fashioned, and their machinery, parti- cularly the mules, not so advantageously con- structed, they need more hands; and water mills require still many more in proportion. Accordingly, therefore, 1 person for every 45 spindles, and one-sixth of these persons em- ployed to be male adults, the amount of the employment will be..... 2000</p>			
Power Looms.....	45,000	18,000	20,000
		5000	50,000
		1,400	1,400
<p>Each loom in Scotland may weave 100 yards annually, on an average.</p>			
<p>ble and stocking..... 2,100</p>		100	2,200
and Cotton Thread-makers..... 200		40,000	40,200
<p>Jarners, Tambourers, Clippers, Heddle and Draw boys.....</p>		20,000	20,000
<p>ers, Clerks, Warehousemen, Muslin-fore- men, Warpers, Starchers, Dressers, Beamers, and Pickers, Tambour-printers, Callen- Glaziers, Packers, and Porters..... 5,200</p>			5,200
..... 1000		3000	4000
<p>interers, Drawers, Engravers, Cutters, saw-works, Dyers, Boilers, Teerers, and others..... 2,300</p>		4000	6,300
<p>machine, Loom, Warping-mill, Bobbin, Brush, Weaver's Glass, Fan, and Shut- ters, and Repairers..... 2000</p>			2,000
<p>To these, several other classes might be added, as Builders of Engines and Cotton works, Colliers, Carters, Leather- workers, Card-makers, &c.; but as they are neither directly interested, nor con- stantly employed in this manufacture, are not included.</p>			
	59,800	91,500	151,300

TABLE II.

ACCOUNT OF THE COTTON TRADE IN SCOTLAND, FOR THE
YEAR 1812.

To <i>Wages</i> paid 59,800 male adults, each averaging L. 35 <i>per annum</i>	L. 2,093,000	£.
— — — 91,500 women and children ditto L. 13 <i>per annum</i>	1,189,500	
	<hr/>	3,282,500

N. B. The masters of the cotton spinners, cotton weavers, calico-printers, and dyers, are not included in the above, as they are supposed to live by the profits.

To *Cotton Wool*.—There are 900,000 spyndles going in Scotland; and the average number of the yarn spun is 48. Two hanks *per day* off each spyndle, is therefore a fair average of the total product, counting three hundred working days in the year, and is.....Lib. 11,250,000

Add one-tenth of the amount for indrink, sand, and seeds.

No allowance is made for the waste cotton, it being generally spun up again into coarse yarns,..... 1,125,000

Total amount of wool, the average price of which, to the spinner, is very nearly 1 s. 7 d. *per lib*.....Lib. 12,375,000 979,687

To *Sundries*.—20 *per cent.* on the amount of wool and wages, for materials added to the value of the goods, and used in bringing them forward in a finished state to the market, viz. gold, silver, silk, linen-thread, worsted, starch and blue; bleaching, dying, and printing stuffs; paper, cordage, and incidents; exclusive of Excise duty, which is not here estimated.....852,457

To *Buildings, Machinery, and Utensils*, for Rent and Repairs, Tear and Wear, of the following, viz.

Cotton Spinning Establishments.—800,000 mule spyndles, including buildings, water wheels and steam engines, 27 s. 6 d. each spyndle.....£. 1,100,000

100,000 water spyndles, including buildings, water wheels and steam engines, 60s. each spyndle 300,000

1,400,000

Power Loom Establishments.—1,560 looms, and appendages, £. 10 each.....15,600

15 factories for ditto, including water wheels and steam engines, average £. 1800 each.....27,000

42,600

Carry forward £. 5,114,624

	Brought forward	£. 5,114,624
ng Establishments.—250, averaging £. 800 each.....	200,000	
Printing and Dying Establishments	420,000	
thread Establishments.....	35,000	
Establishments.....	80,000	

17½ per cent. on £. 2,177,600 381,080

of—say only one thousand warehouses, occupied by muslin, and hosiery manufacturers, and cotton yarn merchants, with rent, and tear and wear of their utensils, in all £. 100 each.....100,000

2. The rents, interest, tear and wear of the housing, loom-shops, and utensils of hand-weavers, hosiers, &c. which they themselves pay out of their respective earnings, are not here stated, as they are supposed to be covered by the amount of their wages, in the first article inserted above.

rest of L. 1,200,000 of floating capital, at 5 per cent. 60,000

Nett cost to the trade, of the whole goods produced, £. 5,655,704
 adding the profit, to those immediately embarked in the trade, to
 10 per cent. the amount of which is565,570

amount of sales of finished goods, great part of which goes to English market by land, and never appears in the export trade Scotland, £. 6,221,214

above profit, however, is altogether exclusive of those made by other branches of the community, indirectly connected with the cotton trade; such as, viz.

the articles of provisions and clothing furnished to the cotton-merchants, calico-printers, and dyers; also to the furnishers, builders, upholsters of the utensils, dwelling-houses, and loom-shops of weavers and others, who pay the expences thereof out of their own earnings;—and supposing all their earnings are so expended, the amount is,£. 3,282,500

the importer's profit on the raw wool; also the ship-owner's freight thereof; the cost is 979,687

the profits to the furnishers of gold, silver, silk, linen-dyed, worsted, starch and blue, bleaching, dying and finishing stuffs, paper, cordage; the cost is.....852,437

the profits to the annual upholders of machinery, utensils, and tenements for carrying on the trade, on.....381,080

the profit on the original making of that machinery, and the depreciation of these buildings, the sum expended on which, since the cotton trade began, forty years ago, have averaged

Carry forward £. 5,495,704 6,221,214

	Brought forward,	£ 5,495,704	6,221,214
	<i>per annum, even independent of work people's dwelling-</i>		
	houses.....	50,000	
6.	The profits on the rents of warehouses occupied by muslin, incle and hosiery manufacturers and yarn merchants, with tear and wear of their utensils.....	100,000	
7.	The profits made by the receivers of the personal and domestic disbursements of the master spinners, manufacturers, printers, and dyers, on	300,000	
<hr/>			
Total annual disbursements made by the cotton trade to other branches of the community			
£. 5,945,704			
 A part of these disbursements pass through several hands, and give a distinct profit to each, on many of the articles produced to the trade. The average of profit, on the whole, cannot, therefore, be reckoned under $12\frac{1}{2}$ per cent., which, on £. 5,945,704, amounts to.....			
<hr/>			
The gross amount of sales may therefore be fairly estimated at ... £. 6,964,486			

From the great variety of the secondary, or less important manufactures of Scotland, it is judged expedient to insert the particulars regarding them in an Appendix, as any account of branches, similar to that of the preceding articles, would have added too much to the length of this chapter.

General View of the manufactures of Scotland.

The manufactures of Scotland, it is evident, are now carried on to a great extent, and rapidly increasing, though it is scarcely one hundred years since they were placed on a regular footing, and only from about the middle of the last century that we may date the rise and extension of some of the most important branches.

The value of the woollen, linen, (hemp included), and cotton trades above explained, may be estimated at upwards of eight millions sterling *per annum*. The hat and paper manufactures, together with that of iron and the other metals, may amount to two millions. Shipbuilding, and those branches in which timber is chiefly employed, exclusive of the fitting up of houses, is not less than one million. The leather, brewery, distillery,

glass, pottery, soap, salt and tobacco trade, may amount to two millions and a half; and, including the minor branches, it is highly probable that the whole manufactures in Scotland will annually exceed in value fourteen millions sterling, including the price of the raw materials.

SECT. II.

COMMERCE.

THE object of Commercial Industry, is to exchange such commodities as possess any value in the estimation of mankind. The natural and artificial productions of one country, are thus conveyed to another; and the inhabitants of each, are supplied with many articles of comfort or of luxury, which they could not otherwise have obtained. Commerce, is likewise a source of wealth, converting, by the medium of exchange, the produce of the industry of one individual into that of another; and rendering commodities, which would otherwise be useless, of value to the owners.

Commercial Industry is divided into three branches:—1. *The Internal or Home Trade*: 2. *The Foreign Trade*: and 3. *The Carrying Trade*.

These three branches comprehend the *practical operations* of commerce, which are important, in proportion to the facilities which they afford for improving the condition of the human race.

1. *The Internal or Home Trade*.—The extent of the home trade of any country is limited by consumption, which again depends upon the number of the people, their habits and means of purchasing. The internal trade of Scotland, therefore, must be less, in proportion to its population, than that of England, as the inhabitants are less opulent, and have

fewer means of purchasing the comforts and luxuries of life. Besides an extensive inland trade, the coasting trade of Scotland is also an important branch of industry, facilitating the conveyance of commodities, and employing a number of ships and mariners. From the abstract of the coasting trade in the Appendix, NO. V., it appears, that the average number of vessels entered inwards, during the last ten years, is about 13,000 annually; and supposing one entry to have taken place every six weeks, or eight entries in the year, the number of vessels employed in the coasting trade of Scotland will be about 1635, carrying upwards of 81,000 tons, and navigated by nearly 6000 men. If 2000 men be engaged in the different canals, ferries, and rivers, the whole number of men employed in this particular branch of maritime occupation will be about 8000.

2. *Foreign Trade.* — Scotland formerly enjoyed but a small share of foreign trade. The exports were chiefly wool, skins, hides, and other raw materials, which were exchanged for corn, wine, and spiceries. Both the extent of exports and imports must have been very limited, in those times, at least in Scotch vessels; for the whole shipping, in the thirteenth century, did not exceed twenty sloops, exclusive of the galleys and barks belonging to the Hebrides. In the time of Cromwell, the shipping of Scotland, consisted of only 93 vessels, carrying 2724 tons; and 18 barks. Soon after, however, her foreign trade, with the northern and eastern states of Europe, began to increase; and the Dutch cultivated a friendly connexion with the Scotch, chiefly for the conveniency of prosecuting the herring fishery on the coast of Scotland, in which they were deeply and profitably engaged.

About the middle of the last century, an extensive commercial intercourse was carried on from the ports on the eastern coast of Scotland, to Holland, Norway, Sweden, and the different states on the shores of the Baltic. This trade has greatly increased of late years. The imports principally consist of flax, hemp, yarn, linen, iron, corn, wood, tallow, and other commodities, produced in these countries; and in re-

turn, colonial produce, cotton goods, and other manufactured articles are exported. The trade between Scotland and Russia, including that of Archangel, forms the most considerable branch of the commerce of the eastern coast; and the chief shipping ports are Leith, Dundee, Arbroath, Montrose, Aberdeen, Peterhead, Banff, and Inverness. The trade with Spain, Portugal, and the Mediterranean, as well as that of the West Indies, is confined principally to Leith; and the connexion with Canada extends to all the most considerable towns on the east coast of Scotland.

The commerce of the west coast centres almost entirely in the Clyde, which is the grand emporium of the American and West Indian trade. From the middle of the last century, to the year 1772, the merchants of Glasgow imported immense quantities of tobacco from Virginia and the contiguous provinces, which was afterwards exported, both in its natural and in its manufactured state, to every part of Europe, particularly to Holland, whence it was carried to the inland markets of the Continent. The Americans, in return, were furnished with all those useful and substantial articles which suit an infant state. Since the commencement of the cotton manufacture, the commerce of the Clyde has rapidly increased; and a correct idea of its extent may be formed, when it is stated, that in the year 1810, there arrived at Greenock, Port Glasgow, and the city of Glasgow, 3308 vessels, carrying 226,837 tons; of which, 871 vessels, 107,845 tons were from Ireland and foreign parts.

3. *Carrying trade.*—This branch of industry encourages ship-building, and is a profitable source of employment to ship-owners. It consists in carrying commodities from one country to another, for a certain stipulated sum or *freight*, and is carried on to a greater or less extent by the vessels of every nation. The maritime laws of Britain are hostile to the carrying trade of foreign countries; but the state of Europe, of late years, has rendered it necessary, in many cases, to deviate from the strict interpretation of those laws;

and *Licenses* have been granted to neutral vessels to enter our ports, under circumstances, which otherwise would have been prohibitory.

The Scotch ship-owners enjoy a share of this trade, but it is inconsiderable, and their ships are more frequently employed by English merchants, in carrying cargoes to and from America, the West Indies, the Mediterranean, and other parts. Many vessels are also hired by Government as transports, and in both cases make repeated voyages without returning to Scotland. This business is conducted on the capital of the ship-owners, who in general receive ample returns; but it would be difficult to ascertain, either the amount of the capital invested, or the extent of shipping employed in this lucrative trade.

As connected with commerce, which is founded on the principles of exchange, the Banking business is a subject naturally entitled to consideration in this part of the Report.

Banks.—Banks traffic in bullion and bills of exchange; and they may be either of a public or private nature. They are properly commercial institutions, which, by giving credit, or issuing notes as the representative of value, enable merchants, with greater facility, to buy and sell commodities both at home and abroad. Besides a number of private banks, there are three chartered ones: 1. The Bank of Scotland, which was established by charter from William and Mary in 1695. Its original capital was L.1,200,000 Scotch money, or L. 100,000 Sterling; but it has been since augmented to L. 1,500,000 Sterling. There are about twenty branches belonging to this bank, in the different towns in Scotland, under the management of Agents. 2. In the year 1727, the Royal Bank of Scotland was erected by charter. Its affairs are conducted by a Governor and Deputy, with eighteen Ordinary and Extraordinary Directors. And, 3. The remaining chartered bank, known under the name of the British Linen Company, was established in 1746, but it has diverted its capital from its original destination, (the Linen Trade), to

the purposes of banking. These three chartered Banks conduct business on similar principles. In almost every town in Scotland a bank has been established, and in some two or three; but these banks are private copartneries, for the purpose of discounting bills of exchange, and selling drafts on London, Edinburgh, &c. They also, like the chartered banks, give cash-accounts, or loans to individuals, on bonds of security; and traffic in money-matters to a very great extent.

There are thirty banks in Scotland, which issue notes of various amount, payable to the bearer on demand. Several of these banks have branches and agents in many of the principal towns in Scotland; and the total number of places where notes are issued, amounts to nearly three hundred.

Money originally superseded the operation of barter; but since the invention of bills of exchange, and bank-notes, the transmission of the precious metals has been dispensed with. The advantages of the banking system are therefore evident. It augments the circulating medium—gives security to the transmission of property—and enables merchants, and others, to transact business with greater facility.

GENERAL VIEW OF THE COMMERCIAL STATE OF SCOTLAND.

Some idea may be formed of the value and extent of the commerce of Scotland, by the following statement:—

In the year 1812, there belonged to Scotland 2708 ships, carrying 231,273 tons, navigated by 16,300 seamen. In the same year, the number of vessels that cleared outwards, and entered inwards, including their repeated voyages, was 3151, carrying 278,968 tons outwards, and 3113, carrying 269,559 tons inwards.

The total value of imports to, and exports from Scotland, for the year 1810, amounted, for the former, to L. 3,671,158 Sterling, and for the latter, to L. 4,740,239 Sterling; of which, L. 4,126,682 Sterling was British produce and manufactures. The gross revenue of Scotland, for the year 1813,

amounted to L. 4,843,299 : 12 : 11 ; of which L. 639,132 : 5 : 7 was charged for management, drawbacks, allowances, &c. ; so that the net revenue was L. 4,204,167 : 7 : 9 Sterling *.

The effects of commerce and manufactures on agriculture ought not to be here omitted. They furnish an advantageous market for the productions of the soil ; and thus tend to raise the value of the estates, and the rent of lands. Nay, the opulent merchant is often found a most enterprising improver. And though his experience in agriculture is not commensurate to his capital, yet he often becomes a great benefactor to his country ; and in a few years, by his accuracy in accounts, he learns where to spare, and where to lay out his money.

SECT. III.

FISHERIES.

THE importance of the Fisheries, as a source of subsistence and wealth, is so obvious, that it is unnecessary to enlarge upon the subject. Dr Franklin said, that a fish taken out of the sea was as good as a piece of silver ; and the political economist may justly assert, that extensive fisheries are more valuable than the mines of Mexico and Peru ; because the former produce the food of man, which is substantial wealth, while the latter afford only a representative of value, or, at most, a commodity which intrinsically is not of much utility.

The Dutch formerly carried the business of fishing, to a greater extent than any nation, more especially on the coasts of Scotland ; and it was the means of raising the

* For several official documents regarding the shipping and commerce of Scotland, see Appendix, NO. V.

Batavian States, to that height of prosperity which they formerly enjoyed. The people of Scotland, more addicted to war, than to the pursuits of peaceful industry, neglected the most important branches of the fisheries; and it is only of late years that their attention has been directed to this valuable object.

Different Fisheries. — The fisheries of Scotland may be classed under the following heads, viz.

1. Salmon Fishery.
2. White Fishery.
3. Herring Fishery.
4. Whale Fishery, and
5. The catching of Shell-fish.

1. *Salmon Fishery.* — The rivers of Scotland are frequented by immense numbers of salmon, which are caught by nets, yairs, cruives, and other contrivances. The largest rivers are the most productive; and, at their efflux, and on their banks, the fishings are the source of great revenue to the proprietors, especially since the method of preserving salmon by means of ice has been adopted. This plan is justly ascribed to the suggestions of Mr Dempster of Dunnichen, in the county of Angus, who recommended the idea to Mr Richardson of Perth, by whom it was found to answer; and the plan has been universally adopted by the proprietors and renters of salmon fisheries. The market of London is now plentifully supplied with fresh salmon, which are packed in boxes containing ice, and conveyed thither by smacks, or small swift-sailing vessels.

In consequence of this discovery, the price of salmon has been raised in Scotland, at the places where they are caught, at least ten fold; and, of course, the rent of the fisheries has advanced in the same proportion.

Salmon are royal fish, and the right to catch them is con-

veyed by grant from the Crown *, on which investiture proceeds, in the same manner as required in the investiture of land. Various statutes have been enacted for the protection of salmon in *close*, or *forbidden* time, or during their spawning season, and while the *fry* pass down the rivers to the ocean †. The rights of the respective proprietors of fishings are also protected and regulated by statutes, which are frequently explained by decisions of the Supreme Court.

The value of the salmon-fishery of Scotland to the proprietors is very considerable ; and it is a natural source of wealth, which it requires but little capital to render productive. But it is limited, and cannot be augmented by increased industry ; at present, indeed, it is supposed, that the number of salmon are annually diminishing, from the improved methods of catching them. It is not necessary here, to enter into the natural history of this fish ; but it is admitted that they spawn only in fresh water ; hence, their numbers may be diminished by various causes, not applicable to those species of fish which breed in the ocean.

Salmon, from their scarcity, are a delicacy, which is only within the reach of the more opulent part of the community. Compared with white fish, their price, in the markets of Scotland, may be ten times higher. The value of the whole salmon caught in the rivers of Scotland, is estimated at L. 150,000 *per annum*.

* Salmon fishings being *inter regalia* in Scotland, they require an express grant to deprive the Crown of a right to them. A general clause, *cum piscationibus*, in the Crown charter to land, is held to entitle the proprietor, however, if followed with possession, to acquire a right to a salmon fishing by prescription. (*Ersk. B. II, tit. 6, § 15.*)

† To kill salmon from the 15th of August to the 30th of November, was prohibited by statute, James I, Parl. 2, c. 35, An. 1424. By different acts, the punishment for killing salmon in *close time* was various and severe. By James VI P. 6, c. 72, 1503, it was, for the first offence, L. 10 Scots ; for the second, L. 20 Scots ; for the third, Death. The spawning time, however, being different in different rivers, the forbidden season is generally regulated by local acts, or, what is the same thing, the opening and shutting of the fishing season.

In all the rivers of Scotland, there are considerable quantities of small fish, such as trout, eels, &c. In some rivers, and in many of the lakes, there are pike and perch; and in a few lakes the char is found: But they are seldom caught in such abundance as to form an article of commerce; with the exception of the trout of Lochleven, which are annually let at L. 100 of rent.

2. *White Fishery.*—This is a most valuable branch of the Scotch fisheries, both from its extent and its variety. It comprehends every species of white fish, with which the coasts of Scotland so plentifully abound; including *haddocks, cod, ling, &c.* with all kinds of *flat* fish. Those who pursue this branch are denominated *White-fishers*, and they inhabit the sea-ports, or reside in numerous villages along the whole coast of the kingdom. Their mode of fishing is by lines and nets, but principally by the former; and they carry on their business throughout the year. The fish they catch are daily sold to the inhabitants of the towns and of the country, either as caught or cured. There are various methods of curing them, (particularly the haddock), peculiar to almost every district; and of late years, great quantities of cod have been salted for the London market.

3. *Herring Fishery.*—The eastern and western coasts of Scotland are frequented periodically by prodigious shoals of Herrings, which penetrate into the bays, lochs, and arms of the sea. They are taken by nets, salted, and packed in barrels. When prepared in this manner, they are termed *White Herrings*; but when smoked and cured by a particular process, they are distinguished by the name of *Red Herrings*.

This species of fish is found in the greatest abundance on the shores of the Hebridean islands, and in the lochs and bays of the western coast. The attention of the public has been chiefly directed to these quarters; and much expence has been bestowed by government, to encourage and promote the fishery, with the twofold view, of raising seamen for the navy, and furnishing profitable employment to the natives of the

Highlands and Hebrides. To promote this important branch of industry, especially in the deep sea, a Board of Commissioners was established by act 48. Geo. III. to superintend and encourage the fishery. A tonnage bounty of L. 3 *per* ton is allowed to all vessels of 60 tons and upwards, fitted out for the deep-sea fishery, besides 2s. on every barrel of herrings properly cured and repacked: and by the act 52. Geo. III, c. 153, the bounty of L. 3 *per* ton is extended to vessels of 45 tons burden.

Notwithstanding the encouragement thus afforded to the deep-sea fishery, it is not likely to succeed on the system adopted. In 1809, only three vessels were fitted out; in 1810 and 1811, seven vessels; and, in 1812, ten; which caught, in these several years, 709½, 978½, 1588, and 2839½, barrels of herrings. The bounties paid amounted to L. 5866 for tonnage; which is 19s. 4d. *per* barrel.

The coast fishery, however, presents different results. In the above four years 505, 532, 594, and 923 vessels were fitted out, which caught and cured 89,476; 90,849; 109,931½; and 150,646½ barrels; of which the bounty of 2s. was paid on 218,821 barrels of herrings. It must be observed, that the returns made to the Board do not include the whole quantity of herrings caught and cured. It comprehends only the proceeds of those fisheries, which have complied with the regulations of the statute, and are under the cognisance of the officers of the Board. The account received from the Excise, of the quantity of herrings caught and cured for the year ending in May 1812, amounted to 190,006 barrels, for which salt, duty free, was used. From various local and other circumstances, it often happens, that duty-free salt cannot always be obtained; and it is not estimating the quantity too high, to calculate 10,000 barrels annually caught, and not returned to the officers of Excise. The total quantity of herrings taken and cured for the year 1812, may be reckoned at not less than 200,000 barrels, besides 50,000 barrels con-

packed in a fresh state; which, being in all 250,000 barrels, presents a flattering view of the value of the herring fishery.

It was formerly imagined, that the only herring fishery on the coast of Scotland worthy of attention, was in the western lochs; but on the eastern coast of Caithness, the herring fishery has proved highly successful; above 120,000 barrels have been caught in one year, (*an.* 1813), and the fishery on this coast, promises to become a great source of national wealth.

The extension of the herring fishery is an object that merits the serious consideration of the community, as its produce is so valuable, either for home consumption, or as an article of exchange with foreign nations. Every public encouragement, and every facility that can tend to promote it, should be afforded; but it is to be regretted, that loud complaints are still occasioned by the vexatious regulations respecting salt. They are so complicated, that those who intend to use the duty-free salt, often lose the opportunity of fishing, before the necessary forms can be gone through. But this objection applies principally to the Loch and Hebridean fisheries, where those concerned must travel great distances to render an account of the salt at the proper office, and where crowds of officers, having an interest in forfeitures, are ready to embarrass the forms, that compliance with them may be more difficult.

The value of the herring fishery of Scotland may amount to half a million annually; but when we consider, that it may be carried to an extent almost unbounded, and that it is the best nursery for hardy seamen, the fishery may be deemed a source of national wealth, of the highest importance to this maritime and commercial country.

4. *Whale Fishery.*—This branch of industry is carried on, in the seas of Greenland and Davis's Straits. From the state of Europe, it is at present confined almost exclusively to the British Islands; and Scotland enjoys a considerable share. The produce of this fishery, is, 1. *Oil*, which is of infinite importance, whether for the purpose of affording light, or being

used as an ingredient in the manufacture of soap; and, 2. *Whalebone*, which is manufactured into various useful articles.

As the ships employed in this fishery are large, and their equipment expensive, it can only be carried on by those who have a great command of capital. Government, however, has afforded considerable encouragement to the adventurers, by allowing large bounties; but the national advantages derived from it, as a nursery for seamen, and as a substantial source of wealth to the country, greatly overbalance any public sacrifice that has been hitherto made for its protection and encouragement.

The profitable nature of this fishery may be illustrated by a single instance. During the last seven years, the four whale ships belonging to Aberdeen have caught 248 whales; which produced 3396 tons of oil; and 150 tons of whalebone. These may be estimated at L. 140,000 Sterling in value, or L. 20,000 a-year. The whale fishery of Peterhead, in 1813, produced L. 40,000.

From the increased consumption of oil, by the introduction of Argand's lamp, which is now in general use, not only in manufactories and shops, but in private houses, the importance of the whale fishery has been greatly augmented, whether we consider it as a national object, or as a profitable employment for the capital and industry of individuals. It therefore deserves, not only every encouragement which government can bestow, but, as a source of private riches, it also merits the attention of capitalists, whose active exertions might render it much more productive.

5. *Shell-fish*.—The lobster fishery is carried on to some extent, principally during the spring months*. Immense numbers of this species of fish are to be found along the rocky

* Killing lobsters on the coast of Scotland from the 1st day of June to the 1st day of September, is prohibited under the penalty of L. 5 Sterling, by statute 9. Geo. II, c. 33, § 4. But this act is not enforced.

coasts of Scotland, the Hebrides, Orkney and Zetland. One fishing in Zetland, it is said, produces about L. 15,000 worth of this fish annually; which are sent to the London market, where they fetch a high price.

Under the same head may be included *Crabs*, *Oysters**, *Cockles*, and other kinds of shell fish. They form an object of some importance to the inhabitants of Scotland; and are not only accounted delicacies by the rich, but, in particular situations, they are found in such abundance, as to constitute a part of the subsistence of the inhabitants.

Having thus enumerated the different branches of the Scotch fishery, and made some general, but concise, remarks on them, it must be evident to the reader, that this species of industry is of the highest national importance. According to the first principles of political economy, every expedient which augments the stock of human subsistence, becomes an object of public concern, and therefore claims the fostering protection of the Government. In conformity to this principle, bounties have been bestowed, the salt-duty has been remitted, and a *Board* has been established for the encouragement of the Scotch fisheries. All these measures have already brought them to a state of increasing prosperity; and the happiest results may now be expected.

While alluding to bounties, it may not be improper to observe, that such grants cannot be considered as a diminution of the public revenue, as their amount is levied indirectly by

* Oyster fisheries are protected by a late statute, 51. Geo. III, c. 51; which provides, that any person who shall take or catch any oysters, or oyster brood, with any net, trawl, dredge, or other instrument, within the limits of any oyster fishery in the kingdom, or use the same for the purpose of catching them, although none be actually taken; every such person, (other than the owner, lessee, or person lawfully entitled to catch oysters therein), shall be deemed guilty of misdemeanour, and may be indicted at the assizes or quarter sessions for the county or division. The penalty is limited to a fine not exceeding L. 20, or less than 40 s., or to imprisonment not more than three months, nor less than one month.

duties imposed on the commodities consumed in the prosecution of the fisheries. The duties on timber, iron, flax, hemp, spirits, &c. &c. used in carrying on the fisheries, are more than equal to the bounties paid by Government; and thus a resource is established, that preserves the means of obtaining a surplus revenue from those articles.

Were the fisheries of Scotland to be estimated by their produce even in past years, we might justly deem them a great source of national wealth; but when we reflect that they may be carried to a still greater extent, we must consider them as of the highest public importance. The sea which surrounds the British islands, and its subordinate isles, teems with fish in such countless numbers, that they cannot be exhausted by artificial means*. Their propagation depends upon a principle that precludes their total destruction, unless by a convulsion of nature; for their prolific power is so great, that it can only be limited by their means of subsistence, which, as they feed upon each other, must constantly be in a ratio corresponding to their numbers.

When it is considered that the whole coast is inhabited by different species of fish, all useful to man, as furnishing either food or other articles valuable to him, we may conceive some notion of the magnitude of the stores of the sea: And it is not an improbable conjecture, when the art of fishing shall be better understood, and more assiduously prosecuted, that it may be made to produce human food, equal to the maintenance of a considerable proportion of the population of Great Britain.

In their present state, the fisheries of Scotland, taken in

* The increase of fish is said to be in the following proportion: A cod produces 3,686,700 eggs, or spawn; a ling 19,248,625; a flounder of two ounces contains 133,407; one of 24 ounces 1,357,403; herrings, weighing from 4 ounces to 5½ ounces, from 21,285 to 36,960; lobsters, from 14 to 36 ounces, contain 21,699; mackarel, 20 ounces, 454,961; soles, of 14 ounces, contain 100,962 eggs.

aggregate, are of considerable moment. The following table will furnish some idea of their amount.

1. The salmon fishery, and other fish in lakes and rivers,	£. 150,000
2. The white fishery, including cod, ling, haddock, &c. and various kinds of flat fish,	400,000
3. The herring fishery,	500,000
4. The whale fishery,	200,000
5. Shell-fish,	50,000
	<hr/>
	£. 1,300,000

Important as this branch of national industry is at present, it is nothing to what it might be rendered by private industry, and public encouragement, judiciously applied *.

SECT. IV.

ROADS, BRIDGES, CANALS, AND RAILWAYS.

THE most obvious practical expedient for the improvement of any country, is the promoting of internal communication by means of *Roads, Bridges, Canals, and Railways*: For agriculture, manufactures, and commerce, all derive their greatest advantages from the facility of conveying their materials and productions from one place to another.

I. ROADS.

Until comparatively a late period, few carriages were employed in Scotland for the conveyance of commodities; and

* For an important document regarding the fisheries, see Appendix, NO. VI.

the advantage of good roads was not generally understood. But the energies, both of the government and of the people, for above thirty years past, have been powerfully directed to this important object; and various local statutes * for making and repairing roads of all descriptions, from the great *turn-pike*, to the smaller roads of communication, have been enacted by the Legislature.

Statute Labour.—Previous to these enactments, the occupiers of the land, were obliged to labour for six days annually, on the roads passing through their respective parishes; and this work, from having been ordained by act of Parliament, was termed *Statute Labour*, (act 1669, c. 16.)

Management.—The administration of the public roads was, at first, entrusted to the Justices of the Peace, in their several counties, (acts 1617 and 1668); but by subsequent statutes, the Commissioners of Supply were associated with them as managers, (acts 1669, 1670, 1686, 5. Geo. 1, and 7 Geo. II.) These administrators are empowered to provide, that all highways be of proper breadth; to prevent injuries to them; to remove hedges where necessary, &c.; and they are enjoined to hold two general meetings yearly—one on the 30th of April, and the other at Michaelmas—for the purpose of attending to these objects.

Funds.—Originally, the funds for making and repairing roads and bridges in Scotland, arose from the statute labour, and a small assessment on landed property. The statute labour was exacted from the tenants and cottagers only, including their carts, horses, and servants, (act 1669, c. 16). But it was afterwards extended, with few exceptions, to every inhabitant of the parish, (5th Geo. I, c. 30.) The small assessment on landed property was imposed on the proprietors, who still are liable to this payment, which often does not ex-

* The first of these acts was passed in 1750, (23. Geo. II, c. 17), for repairing the great post road from Douglas-Bridge, to the town of Haddington, and thence to Ravenshaugh-burn in the county of Haddington,

ceed ten shillings Scots on the L. 100 of valued rent, (1669), and is levied throughout Scotland under the name of *Road and Bridge money*.

Additional funds.—As the augmented produce of agriculture, manufactures, and commerce, required more extensive, easy, and speedy modes of conveyance, the statute labour was found inadequate to maintain the necessary communication of the country. Accordingly, since 1750, private acts of Parliament, limited to twenty-one years, have been obtained, for making turnpike roads, and for the erection of *toll-bars*, in order to collect a tax from those who used the great public roads, and fixing the *maximum* of such payments. Different *county acts* also regulate the statute labour, which is now generally converted into money; but both the conversion price, and the assessment on landed property, vary in the several counties, according to their peculiar circumstances.

Application of funds.—The tax arising from the toll-bars is applied only to those roads which are denominated *turnpike*: The statute labour, or its conversion price, and the county assessments, are now limited to what are termed *by-roads*, which connect the communication with the great turnpikes, or are calculated for the accommodation of particular districts.

Anticipation of funds.—The funds which are now appropriated, to the making and repairing of roads and bridges, may be *anticipated* by the trustees, as a security for such sums of money, as it may be thought necessary to borrow, for enabling them to accomplish the objects intended. This expedient is often resorted to; and as it furnishes the trustees with a command of money, that otherwise, in many cases, could not be obtained, it greatly promotes a speedy formation of roads to the great advantage of the public.

Mode of making roads.—In general, the *turnpike* roads in Scotland are from thirty to forty feet in breadth, and *metal-*

*led** from twelve to twenty feet of breadth in the middle; the depth of the metal being from fourteen to twenty inches in the centre. The *cross* or *by roads* are commonly twenty-four feet in breadth, and metalled from ten to twelve feet in breadth, and twelve inches deep in the middle †.

Shape of roads.—The most prevalent forms of the roads in Scotland are, the *convex*, and the *inclined*, with a drain or ditch on each side to receive and to convey the surface water; neither *concave*, nor even *level* shapes, have been attempted in North Britain, although recommended by several able engineers, in particular cases, in other countries.

Line of roads.—The *line*, or direction, of a road, is an object of the first importance; and the most level course between certain points, although it may not be the shortest, is now generally preferred. On some of the best constructed roads in Scotland, the acclivities do not exceed the proportion of one foot in forty-two. The perfection of the engineer's art consists, in taking advantage of those favourable circumstances which nature presents; and he may greatly reduce the ascents and descents by a well-directed line ‡.

Expence of roads.—The expence of making roads must vary in the several counties, and even in the same district, as it depends on a variety of circumstances connected with the price of labour, the compensation for surface damage, the nature of the ground, and the difficulty of obtaining the necessary materials.

* Hard stones, broken down to about the size of an egg, are termed *metal*. Granite is reckoned the best kind of stone for a road; other kinds are too soft, excepting gneiss, which cannot be easily broken into proper shapes.

† It is a great improvement on roads to have a footpath for travellers on foot; and the new roads in the southern counties are generally so constructed. In Renfrewshire alone, there are from forty to fifty miles of footpaths.

‡ This art has been brought to its utmost perfection, by Mr Charles Abercrombie, who has lined out above 10,000 miles of road in Scotland, besides what he has executed in Ireland, with uniform success, even in the most difficult districts.

Expence of particular roads.—The road from Ayton-bridge, in Berwickshire, to the English border, cost L.1000 *per* mile, including the expence of bridges, and the compensations for damage done to private property. In Galloway, the expence is stated at L.100 *per* mile for toll, and L. 50 for by-roads. In the shires of Ross and Cromarty it is L. 250 *per* mile, although the roads are only 15 feet in breadth, owing to the number of bridges that are requisite; and in Aberdeenshire, the expence of forming and metalling a turnpike road, at an average, including sewers and bridges, has been, at least, L. 350 *per* English mile. It is obvious, that the expence must, in a great measure, be regulated by the distance of materials.

Average expence.—The above instances furnish some *data* for ascertaining the general expence of making roads in Scotland; and perhaps, the average of the whole is not estimated too high, at the rate of L. 300 *per* mile. In the county of Aberdeen alone, L.150,000 Sterling have been expended on roads and bridges; and when we consider, that similar improvements have taken place in the other districts of North Britain, it is probable, that, within these twenty years, a sum of not less than from two to three millions sterling has been laid out, in this way, to facilitate the internal communication of the country.

Highland roads.—In the Highlands and Islands of Scotland, there existed an objection to the introduction of turnpike acts, arising from the deficiency of funds. In 1803, therefore, a public grant was obtained, authorising commissioners to lay out the one-half of the estimated expence of making roads and erecting bridges in these districts, provided the other half should be advanced by the proprietors immediately interested. Accordingly, it appears, by the report of the commissioners in February 1813, that the whole extent of roads, then executed and in progress, was 584 miles, together with their corresponding bridges. The total expence of these

roads, including bridges, is L.195,712 : 16 : 6 Sterling, or at the rate of more than L.350 *per* mile, one half of which has been advanced by the public. In 1810, an act was passed for the purpose of keeping those roads in repair; whereby, under certain circumstances, an assessment on the land, not exceeding one shilling sterling for each pound Scotch of valued rent, might be levied upon the counties respectively, or upon particular districts of such counties for the above purpose.

This act has hitherto had no effect in securing the constant attention required to keep roads in proper repair; but the commissioners are at present engaged in framing a bill, which Parliament has directed to be prepared, for the purpose of securing to the country, the permanency of those roads and bridges, to which the munificence of the public has so largely contributed.

Great leading roads.—From that laudable spirit of improvement, which of late years has every where manifested itself in Scotland, substantial roads have been made in all directions. The great leading highways being connected by cross-roads, the communication with the towns, villages, and sea-ports, is open to every district or parish; and thus, the productions of industry, are freely circulated throughout every part of the kingdom.

The following table will give a general view of the extent of the principal roads in Scotland, which have been chiefly made since 1750, and three-fourths of them within the last twenty years. They are in general turnpike, with the exception of those in the Highlands termed *military*, from having been executed by the army.

Miles.

1. From Edinburgh to the borders of England and west of Scotland,.....	871
2. From Glasgow to ditto,.....	477
3. From Edinburgh to the eastern and north-eastern districts of Scotland,.....	208
4. From Glasgow to ditto,.....	256
5. From Perth to Inverness and Aberdeen,.....	332
6. From Aberdeen to Inverness, three roads,.....	237
7. From Inverness to Thurso,.....	135
8. Highland roads by the Parliamentary Commission- ers,.....	584

 3100*

II. BRIDGES.

Bridges are erected to continue the communication between the different districts of the country, where it is interrupted by rivers, and inlets of the sea, or by dens, and hollow places. They are made either of *stones*, of *wood*, or of *metal*; or of a combination of these materials; and they consist of one or more arches according to circumstances.

It is not necessary here, to enter into a history of bridges, or even to explain the principles on which their structure depends. It may, however, be requisite to mention, that all the great rivers as well as the smaller ones in Scotland may now be crossed by bridges; and that a chain of communication thus subsists, from the borders of England, to the northern extremity of the island. It may also be remarked, that, as bridges have been erected in almost every practicable situation, where they have been deemed of public utility, the im-

* For a particular enumeration of the great leading roads in Scotland, see Appendix, NO. VII.

provement of the country has been in consequence greatly promoted *.

† But it is of importance particularly to notice the most considerable of those bridges which have been erected of late years, as it will shew the rapid progress of bridge-building in Scotland, and, at the same time, will illustrate, both the present state of the country, and the public spirit of the people, in regard to these useful works.

1. *Stone bridges.*—A very handsome bridge was constructed in 1795, upon the river Teviot immediately above its junction with the Tweed. It consists of three arches—the middle one being 65 feet of span; and the breadth of the bridge over the parapets is 23 feet. Another bridge was erected in 1803 at Kelso, below the confluence of the Teviot with the Tweed, of five arches, which are of an elliptical form, 73 feet of span each, and 26 feet of width over the parapets. An entablature runs along the whole of the bridge, and over each pier; and upon each abutment, are two small columns.

The bridge of Perth over the Tay, deserves to be noticed here, as it is a very fine structure, and was erected only forty years ago. It consists of nine arches—the middle one is 77 feet span, the width across is 26 feet, and the whole length is 906 feet. About the same time, a most useful bridge was erected, of seven arches, over the North-Esk at Montrose.

An elegant and substantial bridge is at present building at Inchinnan over the rivers White Cart and Black Cart, in Renfrewshire. It consists of six principal arches, and the estimated expence is L. 17,000.

But the finest bridge in Scotland is that lately constructed at Dunkeld over the Tay. It consists of five large and two

* See Appendix, NO. VIII, for an intelligent paper on bridges by Mr Crichton, architect in Edinburgh.

small arches. The façade has castellated turrets over the piers and abutments, and the whole aspect of the work is suitable to the magnificent scenery that surrounds Dunkeld. A handsome bridge is nearly finished over the North-Esk at Marykirk. It has four arches—58 feet span each—rise 14 feet—and breadth 21 feet. The whole expence of this bridge will amount to about L. 9000 Sterling. A large and elegant bridge was lately built over the Spey at Fochabers, consisting of four arches. The two middle ones are each 95 feet span, and the breadth over the parapets is 21 feet 6 inches. The expence L. 25,000. Another useful bridge was erected over the Findhorn near Forres, of three arches.

A bridge of one arch was built over the river Dee at Tongueland, near Kirkcudbright, of 118 feet span, which was an arduous undertaking. A magnificent arch was lately erected at Aberdeen, over the Den Burn—130 feet span, and 43 feet of breadth across the soffit. This bridge presents the largest stone-arch in Britain, with the exception of the very narrow bridge over the Taaf in Glamorganshire. A bridge was erected, about the year 1798, over the river of Bervie, at the burgh of Inverbervie, of one arch 105 feet span.

2. *Timber bridges.*—Several elegant bridges have been lately constructed of wood in Scotland. One of the most useful is that over the South-Esk at Montrose, where the tide flows with great rapidity. It consists of piles driven into the bed of the river, with beams laid across them. Mr Burn of Haddington, an ingenious architect, has constructed timber bridges of the handsomest form. They consist of a series of frames in the shape of an arch, and each set is laid horizontally across the soffit. Upon these arched frames, of which there are two rows or ribs placed a few inches distant from each other, a vertical framing is constructed to support the bearers, the joists, planking and gravel of the road-way. On this principle he erected a bridge over the Don, about seven miles from Aberdeen, on the road to Banff. It has only one

arch, which is 109 feet 3 inches span, with a rise of 13 feet 4 inches. It is 18 feet in breadth, and was finished in 1803. Another timber-bridge was built by the same artist at Grandhome, within two miles of Aberdeen. It consists of two arches, each 71 feet 6 inches span, with a rise of ten feet 6 inches. This bridge was erected by Messrs Leys, Mason and Company, for the accommodation of their manufactory on Grandhome-haugh. Mr Burn also constructed an elegant wooden-bridge of three arches over the river South-Esk, in the park of the Hon. William Maule, at Brechin in Angusshire. The middle arch is 58 feet span, and 10 feet rise, and the breadth is 15 feet across the soffit. There are two rows of frames in each arch, with the space of one foot between them; and the piers are built of stone. These are the most ingeniously constructed bridges in Britain; and the principle of their mechanism will admit of very large arches.

3. *Iron Bridges*.—These are of modern invention; the first bridge of this description having been erected in the year 1777, at Colebrook Dale in the county of Salop*.

Bonar-Bridge is an elegant specimen of the combination of *iron* with *stone* arches. It is erected over the Frith of Dornoch in Sutherlandshire, on the great road leading from London to Wick and Thurso in Caithness, and was completed on the 12th of November 1812. It consists of *one* arch of cast-iron, 150 feet span, and *two* handsome stone-arches, one 60 feet, and the other 50 feet span; the road-way is 15 feet in width; the parapets are composed of cast-iron bal-

* *Iron Bridges* may be constructed of arches of an extent of span unknown in former times, as evinced by Mr Telford's plan of a bridge of *one* arch, proposed to be erected over the Thames. The chord line of the projected work is 600 feet, and the versed sine 65 feet. The plan was submitted to twenty persons, the most eminent in Britain for both scientific knowledge and practical skill; and it met with their decided approbation.

lustrades ; and the whole length of the bridge is 440 feet. This bridge was erected by the commissioners for Highland roads and bridges, from a design of Mr Telford's. Those commissioners have just contracted for the erection of an iron-bridge of similar dimensions, with the iron arch at Bonar, over the river Spey at Lower Craigellachie in the parish of Aberlour, which will be of extensive utility ; and it is in contemplation to build a bridge over the Tummel, near its junction with the Tay.

Progress of Bridge-building.—The progress of bridge-building in Scotland, of late years, has been rapid beyond example in any country. Besides those distant and unconnected works already mentioned, not fewer than 1486 bridges, of different sizes, have been either constructed, or are in a state of forwardness, under the direction of the Board of Commissioners for Roads and Bridges in North Britain.

The following are the most considerable.

Besides *Dunkeld*, *Bonar* and *Craigellachie* Bridges already mentioned, there are, *Conan* Bridge, of five arches, one 65, two 50, and two 45 feet span ; *Ballater* Bridge, of five arches, one 60, two 55, and two 34 feet span ; *Lovat* Bridge, of five arches, one 60, two 50, and two 40 feet span ; *Wick* Bridge, of three arches, one 60, and two 48 feet ; *Alford* Bridge, of three arches, two 60 and one 48 feet ; *Potarch* Bridge, of three arches, one 70, and two 45 feet of span *. There are

* This bridge, when nearly completed, was thrown down last winter by a great flood.

The accident happened in consequence of a great number of detached trees having been thrown into the river for the purpose of being floated down. The trees came down in so great numbers, and with such rapidity that it was impossible to have them all parried off from the centres, which were still standing under the arches. The centres were swept away, and the fall of the arches, one of which was not keyed, was the immediate consequence. The bridge has since been completed in a masterly manner. The Parliamentary Commissioners, impressed with the danger of bridge-building, arising from the system of floating

likewise upwards of 60 bridges of one arch each, from 30 to 60 feet of span; and, altogether, the improvements carried on under the directions of this Board, are on a scale of magnitude worthy of a great nation.

III. CANALS.

Navigable Canals afford great facilities for the conveyance of commodities; and, both from lessening the expence of land carriage, and from conveying safely, many articles liable to be injured by the motion of carts, waggons, &c. they are a valuable improvement on the means of communication.

Number of Canals.—There are five great canals in Scotland for public accommodation, besides that of Monkland, which is of considerable extent, but for the sole accommodation of the proprietors of that particular canal. Those for the use of collieries and other private works, need not be here particularly enumerated.

1. *Forth and Clyde Canal.*—This was the first canal in North Britain adapted to public utility; and, cutting across the island, it unites the opposite seas. It is thirty-five miles in length, and more than eight feet in depth. The size of the locks admits vessels drawing eight feet of water, and not exceeding nineteen feet of beam, and seventy-three of length. The expence of making this canal, which was finished in the year 1790, was L. 200,000 Sterling, of which L. 50,000 were advanced by Government, out of the proceeds of the forfeited estates, but which has since been repaid.

2. *Caledonian Canal.*—When completed, this canal will also connect the two seas, as it extends from the Moray Frith on the east coast, to the great arm of the Western Ocean, called *Linne Helloch*, along the line of the military forts in Inverness-shire. It is to be made entirely at the expence of

down detached trees, procured an act of Parliament last session, regulating the floating of detached logs or trees, while there were centres or frames erected for the purpose of building or repairing bridges.

the Government, and the sum estimated to complete it is computed at L. 500,000 Sterling. This canal is 20 feet deep, 50 wide at bottom, and 110 at the top. The locks are 40 feet broad, and 170 in length; so that frigates of 32 guns, and merchant ships of 1000 tons burden may be admitted.

3. *Crinan Canal*.—It extends across the peninsula of Kintyre, and shortens a voyage from the West Highlands and Hebridian ports to the river Clyde about 200 miles. It is 9 miles in length, 12 feet deep, and of breadth sufficient to admit vessels of 160 tons burden. The expence of making this canal amounted to L. 140,000 Sterling.

4. *Ardrossan Canal*.—This work is in progress, and, when completed, will extend from Glasgow, through Paisley and Johnstone, to the harbour of Ardrossan on the west coast of Ayrshire, $31\frac{1}{4}$ miles, and the estimated expence is L. 125,000 Sterling. It has been carried from Glasgow to Johnstone, a distance of 11 miles, at an expence of about L. 90,000. The width, at the surface, is 25 feet, and 13 at the bottom: the depth of water is 4 feet, and the passage in the bridges 11 feet. It was begun in 1807.

5. *Aberdeen Canal*.—This canal extends from the harbour of Aberdeen to the burgh of Inverury, a distance of 18 miles and one-fourth, and it was opened in the year 1807. It was originally 17 feet wide and 3 feet deep; but, by subsequent operations, it was made, through the greater part of its course, from 21 to 23 feet in breadth, and 3 feet 9 or 10 inches in depth. The whole expence of erecting this work, previously to the 31st of December 1808, amounted to L. 43,895 : 18 : 10 Sterling.

IV. IRON RAILWAYS.

Iron Railway from Kilmarnock to Troon Bay.—Iron Railways are a late invention, and with the exception of those for the accommodation of coal, lime, and iron-works, there is only one in Scotland, of any considerable length. It was lately executed at the sole expence of the Duke of Port-

land, whose attention to the improvement of his northern estates does him infinite credit. *It extends from Kilmarnock* in the county of Ayr, to *Troon Bay* at the mouth of the Frith of Clyde, a distance of about ten miles. The whole expence of making it, is supposed to exceed L. 40,000 Sterling. It is understood that one horse will draw on this railway from ten to twelve tons along its declivity, and from eight to ten in the contrary direction.

From Berwick to Kelso.—An act has passed for erecting a railway to extend from Berwick on the Tweed, to Kelso in Roxburghshire; the distance is 23 miles, and the estimated expence, including a bridge across the Tweed, is about L. 90,000 Sterling. A railway has likewise been proposed between Glasgow and Berwick, which would establish a communication between the manufacturing districts of the west, and the agricultural counties of the south-east of Scotland.

Power of horses on a railway ascertained.—The advantage of railways to the power of horses, in dragging a loaded carriage, is astonishing, when compared with what they can possibly perform on the very best roads. It has been ascertained by experiment, that a horse of L. 20 value, will draw upon a railway, with a declivity of one foot in the hundred, 32 tons with ease, and 43 with some difficulty while descending; and 7 tons in a contrary direction, exclusive of the weight of the carriages.

Peculiar advantages of railways.—The superiority of railways over canals, seems to arise from their occupying less ground, and their formation being less expensive, also, from being more easily repaired, and the passage on them not so liable to interruption by frost. Were iron railways adapted to common carts, laid down upon the ascent of roads, a horse would be enabled to draw a load, upon an ascent of one foot of rise, in twelve feet of road, as he does upon the level parts of most roads in this island. Mr Monteith of Closeburn, who suggests this hint, saw, in summer 1813, one horse at

the Shott's Iron-works, draw three tons of iron, up an ascent of one foot in fifteen, in a common cart.

SECT. V.

WEIGHTS AND MEASURES.

THE regulation of weights and measures was the subject of parliamentary jurisdiction in Scotland; and various statutes were enacted, for the purpose of fixing a standard, from which it was punishable to deviate. But the last Scotch statute by which they are regulated, was passed *anno* 1621, (James VI. Par. 23, ch. 16), in consequence of a report by commissioners appointed to ascertain a standard for that part of the kingdom; and it was accordingly fixed as follows:

1. *Weight*.—The French Troy stone, having 16 pounds in the stone, and 16 ounces in the pound, with the smaller denominations in proportion, is the unit of the standard of weight, which was committed to the care of the burgh of Lanark. A pound of this standard, contains 7621.8 grains of the English Troy pound, which is held to contain 5760 grains. Meal was directed to be sold by this weight, (act 1696, c. 6.), at 8 stones, in place of the boll of Linlithgow measure; also bread and butcher meat, (act 1681, c. 24.).

2. *Extent*.—The standard for measures of extent, is the ell of Edinburgh, of 37 Scotch inches, which was ordered to be kept by that city. According to this measure, 3 barley corns make one inch, 12 inches 1 foot, and 37 inches 1 ell. All wrights, masons, glaziers, and other public workmen, are directed to use this *foot* measure only, which is also the standard for the mile, being 1760 yards. An acre contains 5760 square-ells; and for measuring *plaiding* and other coarse stuffs, an ell is used of $39\frac{1}{2}$ inches.

3. *Capacity.*—The standard for *Liquid* measure, is the Stirling pint Jug, which was ascertained by the weight of its solid contents, being 3 lib. 7 oz. of the water of Leith; and it was ordered to be kept by the burgh of Stirling. It contains 108.404 English cubic inches. The standard for *Dry* measure is the Linlithgow Firrot, which is regulated by the Stirling Jug;—that for wheat, &c. contains 21 pints and 1 mutchkin, or $\frac{1}{4}$ of a pint—and that for bear, &c. 31 pints*. The firrot for wheat, &c. is directed to be $19\frac{1}{8}$ inches wide, and $7\frac{1}{2}$ deep; and that for bear, &c. the same width, and $10\frac{1}{2}$ deep. This standard was directed to be kept by the burgh of Linlithgow.

Altered by the Treaty of Union.—Although the Legislature had thus fixed standards for weights and measures in Scotland, yet it was deemed expedient to supersede them, by introducing the English standards. It was, therefore, provided, by the 17th clause of the articles of Union, “That from and after the Union, the same weights and measures shall be used throughout the united kingdom, as are now established in England; and standards of weights and measures shall be kept by those burghs in Scotland, to whom the keeping the standards of weights and measures, now in use there, does of special right belong,—all which standards shall be sent down to such respective burghs, from the standards kept in the Exchequer at Westminster, subject nevertheless to such regulations as the Parliament of Great Britain shall think fit.” The standards were accordingly sent down; but were found to be quite disproportionate to one another. Hence the Supreme Courts have, in several instances, adopted the Scotch standards, particularly in adhering to the Linlithgow measure, in the modification of ministers’ stipends. The legisla-

* *Wheat, Rye, Beans, Peas, and White Salt*, are directed to be measured by this firrot; and *Malt, Barley, and Oats*, by the other. It was the practice in measuring barley, &c. to heap the firrot. Accordingly, one of larger dimensions was made to contain the additional quantity given by heaping.

ture has also acknowledged them, in the act 24. Geo. II. ch. 31. in regard to the sale of lintseed.

English Weights and Measures used in Scotland.—In collecting the revenue, the following English weights and measures are used in Scotland by both the Excise and Customs.

1. *Weight.*—Three different weights are used ; 1. Troy ; 2. Avoirdupois ; 3. Scotch Troy, or Dutch.

1. Troy weight is used for all valuable articles ; such as gold, silver, &c. ; and contains 12 Troy ounces in the pound.

2. Avoirdupois weight, (the pound of which contains 7000 grains of English Troy), is used for all groceries, drugs, tallow, lead, iron, &c. and it contains 16 drams in an ounce ; 16 ounces in a pound ; 28 pounds in a quarter ; and 4 quarters in a hundred weight.

3. Scotch Troy is used for rating meal, and in a great part of Scotland for butcher meat.

2. *Measures of extent.*—The English measure of length is used for bricks, tiles, wood, all printed goods, &c. subject to public duties. It contains 12 inches in a foot, and 3 feet in a yard.

3. *Measures of capacity.*—In liquid measure, two standards are used both in commerce and in the collection of the revenue.

1. The wine gallon, which contains 231 cubic inches, is used for wines, spirits, oils, &c. ; also for ascertaining the contents of stills ; and $31\frac{1}{2}$ gallons make a barrel. 2. The ale gallon of 282 inches, is used for ale, beer, and home-made vinegar. The contents of casks containing salted fish, or meal, are rated by the wine gallon. The barrel of salted beef, white or red herrings, &c. contains 32 gallons, and a barrel of salmon 42 gallons.

For dry measure, the Winchester bushel, of 2150,42 cubic inches, is sometimes used for rating grain, flax-seed, onions, &c. There are other bushels in use by the revenue, which differ either in their contents, or by being *streaked* or *heaped*, according to the commodity to be measured. The bushel

contains 4 pecks ; each peck 2 gallons ; and there are eight bushels in a quarter, and $4\frac{1}{2}$ quarters in a chalder *.

Different weights and measures used in Scotland.—From what has been stated, it is evident, that *two* kinds of weights and measures are used, and legally acknowledged in Scotland : 1. Those which were fixed by the general statute of 1621 ; and, 2. Those which are used in the collection of the revenue ; and partly in commerce. It is of little importance, perhaps, what may be the unit of the standard, provided it were fixed, and introduced into practice. But the influence of long established custom has prevented the general use of the legal standard in Scotland ; and in every county, there are local weights and measures, by which corn and other commodities are sold. So numerous indeed, are the varieties of weights and measures, that each county has not only its own peculiar standard, denominated by its name, but in many of them three or four different standards prevail, by which the transactions of individuals are regulated. The exertions of the Highland Society of Scotland, to obtain an equalization of weights and measures, cannot be too highly praised.

FIARS OF GRAIN AND ASSIZE OF BREAD.

These are subjects properly connected with this section of the chapter ; and shall therefore be concisely explained.

1. *Fiars.*—From time immemorial, the Sheriffs and Stewards have been in the practice of *striking* the Fiars in Scotland annually, that is, they fix the average price of grain for the preceding crop in the month of February (betwixt the middle and the end of March), which is ascertained in every county by a jury, except in the county of Haddington †. As

* See the Report on Weights and Measures by the Committee of the Highland Society of Scotland. The English standard of length is now almost universally used in Scotland, and the Winchester bushel is generally the standard in several of the more southern districts.

† The mode of procedure in striking the fiars, is regulated by an Act of Se-derunt of the Supreme Court, bearing date the 21st December 1723.

according to the Fiars, all bargains of reference are determined, and also the conversion price of rents and stipends of the clergy when paid in kind.

2. *Assize of bread.*—The assize of bread regulates its price according to the market price of grain. By the two general statutes in the reigns of Geo. II, and III, the power of fixing the assize is given, in towns, to Magistrates; and in the country, to any two Justices of the Peace. Tables accompany these acts, shewing what ought to be the price of bread of a given weight, according to the price of wheat and other grain; also, what ought to be the weight of bread sold at a given price.

Illustration of the mode of applying the assize.—All bread must be sold by *avoirdupois* weight; and the peck loaf must be 17 lib. 6 oz.—half peck 8 lib. 11 oz.—quarter of a peck 4 lib. 5½ oz.—and half a quarter of a peck 2 lib. 2½ oz. whether *wheaten* or *household* bread. When the price of the Winchester bushel of wheat is ten shillings, including the allowance made to the baker for baking, the price of the peck loaf will be 3 s. 10 d. for *wheaten* bread, and 2 s. 10 d. for *household*; and in the same ratio for the half peck, quarter, &c. By the 13th of Geo. III, c. 62, an intermediate quality of bread between the *wheaten* and the *household* is allowed, termed the *standard wheaten bread*, which is made of the whole produce of the grain, without any mixture or division, “the bran or hull thereof only excepted.” The price of this bread, in proportion to the other kinds, is as 7 to 8 and 6: That is to say, if *wheaten* bread be 8 d., and *household* 6 d., the *standard wheaten bread* will be 7 d.; or, seven standard wheaten assized loaves will cost equal to eight wheaten, or to six household assized loaves. That Magistrates and Justices may know, at all times, whethert he baker has more or less than the allowance they intend to give him for baking, the sack of flour is fixed to weigh 2 cwt. and 2 quarters neat, *avoirdupois*; and from every such sack 20

peck loaves ought to be produced, weighing 17 lib. and 6 oz. when well baked.

Such are the regulations which the Legislature has thought proper to adopt in regard to the assize of bread; and they are generally observed throughout Scotland. Whether it be expedient to fix the price of this commodity by law, is a question which has admitted of much discussion, and given occasion to a difference of opinion, which has not yet been finally determined*.

SECT. VI.

FAIRS AND MARKETS.

FAIRS and Markets are public assemblies for the purpose of buying and selling cattle, goods, &c. Fairs are generally held in the country, periodically, or at stated seasons. Markets are mostly confined to towns, and held once or twice a-week †.

Authorised by charter.—Both fairs and markets are authorised by royal charter; these convey a right to levy a duty

* It is said, that in practice, beneficial consequences have resulted from the assize of bread, as the competition among the bakers is confined *entirely* to the *quality* of the bread; the quantity and price being the same within the range of the assize. The public are thus supplied with bread of a superior quality than they might otherwise be, if *quantity* and *price* were to fluctuate according to the different interests of the bakers. The allowance made to the bakers, also, for manufacturing flour into bread, is by statute nothing more than a fair profit.

† It was anciently the practice in Scotland to hold *fairs* on Sabbath and holy days, which was abolished by act James III, P. 3, ch. 14, which says, 'that no fairs be holden on holy-days, but on the morn after.' The statute of James IV, P. 12, ch. 122, also declares, that 'towns and paroches which had mercats on

on the articles exposed to sale, termed *custom-dues*, which, in the one case, belongs to the proprietor on whose land the fair is situated; and in the other, to the Magistrates of the burgh where the market is held.

Denomination.—In Scotland, fairs are classed, either according to the commodities exposed to sale, or the nature of the business transacted in them, and are so denominated. There are fairs for cattle, sheep, horses, cloth, &c. held on separate days; and, in some instances, the whole are combined. There are also fairs appropriated entirely to the engaging of servants, particularly for agricultural purposes.

Markets.—In the sense we have viewed them, markets are peculiar to towns; and held once or twice a-week for supplying the inhabitants with meal, butcher-meat, fish, &c. There are also corn-markets, held weekly, for disposing of grain, either by presenting the stock, or by sample; which last mode has been generally adopted in the northern districts of Scotland.

Trysts.—Trysts are similar to fairs in their object, and are common in Scotland. They may be termed *meetings by appointment*, as they are held for the mutual accommodation of buyers and sellers, and are not authorised by charter, but regulated by the proprietors of the land where they are situated.

Object of fairs and trysts.—The utility of fairs and trysts seems to arise, from the opportunity they afford, both to buy-

the Sabbath, which are now prohibite, may choise any other day in the week for holding the same, if it be not the mercat day of the next town.' It was, however, afterwards enacted, 'that no royal burgh keep mercat on Monday or Saturday, under the pain of an hundred merks, but that they change the same to other days; but fleshers in these burghs may keep flesh meat on those days.' (Charles II, P. 1, sess. 3, ch. 19.). This act was ratified by William and Mary, P. 1, sess. 5, ch. 14, 'provided they' (burghs of regality and barony) 'make intimation to the next adjacent burghs, and pitch not on the mercat day of any royal burgh, or mercat town, within four miles, fleshers excepted.'

ers and sellers, of purchasing, and disposing of, either large or small lots of cattle, horses, sheep, cloth, &c. The disposable produce of the country, being thus brought to a certain place, on a certain day, both buyers and sellers of every description may transact business, either on a large or a small scale, as their exigencies may require.

Forestalling.—Forestalling or regrating, which may be denominated any unfair interference with the market, is punishable by heavy penalties. But as it was difficult to determine what really comprised the crime of forestalling, the Court of Session has lately explained it (1801); and it was their unanimous opinion, “that the statutory offence consisted entirely in buying up commodities, actually on their way to market.”

SECT. VII.

REGULATIONS OF THE PRICE OF PROVISIONS AND LABOUR, AND STATE OF THE CORN-LAWS.

Anciently regulated.—The price of commodities, and the wages of labour, were formerly regulated by statutory authority. By act Queen Mary, Par. 5, ch. 23, it is ordained, “that reasonable prices be set on craftsmen’s work, and all victuals to burgh and landward, by the Magistrates and Sheriffs.” Similar statutes had been passed in the previous reigns of James I. and IV.; and the price of almost every commodity was fixed by the legislature.

Partly regulated at the present time.—The practice of interfering with both the money price of provisions, and the wages of labour, is not yet entirely abolished. The assize of

in the one case, and, in the other, the regulations of Justices of Peace, in regard to the wages of Porters, &c. are sufficient instances of the remains of those rules, which guided the conduct of our ancestors in the administration of the country.

Policy of such regulations.—To limit the price of produce below what they would bring in the market, must be against the production of food; and to fix the wages of labour, below their natural rate, must injure the labourer, proportionally diminishing his power to obtain the commodities and necessaries of life. To augment either, by artificial means, would be tantamount to establishing a monopoly in favour of one part of the community at the expence of the rest; and to enhance the price of both, (for their relative value is unalterable), would be only to reduce the value of money, which is at all times nominal. Any violation of that natural arrangement, therefore, which subsists between those who produce commodities, and those who consume them, disturbs that balance, which equalizes the exertions of labour, and renders the labour of one class of society a competition for that of another*.

THE CORN-LAWS.

The object of these laws is, to fix such rates for export and import, that the price of corn may neither be too much enhanced on the one hand, nor too much reduced on the other. If these rates are established on judicious principles, the interests of agriculture are promoted; whilst, in the case of any deficiency in domestic production, every risk of

In the last Session of Parliament, an act was passed, prohibiting the interference of Magistrates with the price of the wages of labour. For a table shewing the price of corn since the year 1711, see Appendix NO. IX. This will afford data for ascertaining the gradual advance both of labour and provisions, what is the same thing, the gradual depreciation of money.

scarcity or famine is prevented, by the liberty of importing foreign grain. In a country, however, situated as Great Britain is at present, where the taxes, directly or indirectly affecting agriculture, are so high, the admission of foreign grain, except under very great limitations, would be attended with very ruinous consequences. This has already been severely felt; for though the rate of importation for wheat, was raised 4 s. 6 d. *per* quarter in 1791, and 13 s. *per* quarter more in 1804, yet neither of these were adequate to the increasing expences attending the cultivation of that commodity. This is the more to be lamented, as the price of corn, and consequently the whole agricultural interests of the country, may now be considered as entirely regulated by the rate at which importation is permitted.

Bounties on exportation.—With the view of promoting agriculture, bounties on the exportation of corn, in seasons of plenty, have been granted. Dr Adam Smith and others have maintained, that these bounties have produced no good effect. “The extraordinary exportation occasioned by the bounty,” Dr Smith says, “not only, in every particular year, diminishes the home, just as much as it extends the foreign market and consumption, but, by restraining the population and industry of the country, its final tendency is to stunt and restrain the gradual extension of the home market, and thereby, in the long-run, rather to diminish than to augment the whole market and consumption of corn *.” Malthus has ably refuted these doctrines by observing, “That a cultivation so extended, as to prepare an annual excess for a foreign vent, is the best provision against those recurring years of deficiency of crop which may ever be expected, at no very long intervals; because, by suspending exportation, and confining to domestic supply, the product of that cultivation, which the foreign vent had excited, this greater breadth of cultivation will tend

* Wealth of Nations, Book 4, c. 5.

to compensate, in great measure, the general deficiency over all *."

Bounties on importation.—In times of scarcity, bounties on importation have been also given, in order to reduce the price at home, and to prevent famine. These bounties, however, have been justly objected to, on the ground, that foreigners, being aware of the bounty, will raise the price in the foreign market, exactly to its amount; and thus the importing country will pay, not only the natural price of the corn, but also the bounty granted by Government.

Agricultural encouragement.—On this subject it is only necessary to observe, that from the complete establishment of a judicious system of corn laws in 1700 and 1706, until the year 1757, when they were first suspended, (a period of above fifty years), no country ever was in so prosperous a condition in regard to food. The price of grain was steady and moderate, considerable quantities were occasionally exported with the encouragement of a bounty, for which large sums were remitted by foreign countries, and the bounty never occasioned too great an export. But whenever the corn laws were altered, (which was unfortunately the case in 1773), and the wise system of encouragement was abandoned, then sudden alterations in price,—scarcities almost bordering upon famine,—importations of a foreign growth, sometimes even with a bounty,—and a diminution of home produce, were the necessary consequences †. In the hopes of a revival of the old system, great exertions have recently been made by the landed and farming interests, to increase the extent of land in cultivation, and to augment the produce of the ground formerly in tillage. The result has been, that in favourable seasons, we are now able, with the assistance of Ireland, to supply our-

* Essay on Principle of Population, Book 3, chapter 10, "Of the bounties on the exportation of corn," where that subject is discussed with uncommon ability.

† Discouraging agriculture, is, in fact, destroying the hen that lays the golden eggs.

selves, and nothing is wanting, but that the Legislature should forthwith interpose, to protect the farmer in his industrious pursuits, to enable us, instead of being an importing, to become again an exporting country, with all the advantages derivable from that change of circumstances *.

SECT. VIII.

THE NECESSITOUS POOR, AND THE LAWS REGARDING THEIR PROVISION.

Ordinary funds for their support.—The ordinary funds for supporting the poor in Scotland, arise from the following sources: 1. Weekly collections in the churches, and charitable donations. 2. Letting out to hire a hearse or pall. 3. The interest of money lent; and the rents of mortified lands and houses. 4. Fines for breaches of church discipline. And, 5. Fees at marriages and baptisms. These funds are generally left to the management of the minister and elders, or kirk-session of the different parishes.

Additional funds by assessment.—If these ordinary sources of revenue, however, be inadequate to the support of the poor, the law then directs, that their claims shall be investi-

* It is the great object of the corn-laws, to render the country independent of a foreign supply of corn, both in ordinary years, and in times of scarcity. For accomplishing that object, it is expedient, 1. To encourage a steady demand for corn at home, induced by a consumption that could be easily and effectually discontinued for a time if necessary, without materially affecting the general interests of the society. The distilleries, and the brewery, seem to be well calculated for that purpose. And, 2. To raise the rate at which foreign corn may be imported free of duty, and to proportion the duties on such corn, that as the price of corn falls below that high price, the duty on foreign corn may be increased gradually, till it amount to a prohibition.

gated, and a list of those entitled to relief be made out, in order that the deficiency may be provided for by an assessment on the parish. The general statute which authorises an assessment for this object, was passed *anno* 1579, James VI, Parl. 6, c. 74. It was ratified and enforced by various subsequent enactments of the same reign, and in that of Charles II, and also by the royal proclamations of William and Mary.

Fixing the assessment.—The duty of adjusting the list, and fixing the assessment, is entrusted to the heritors and kirk-session; and they may assemble for that purpose, as often as the circumstances of the poor may require; their meetings being called at ten days' notice or more, by intimation made in the parish-church; or, where the parish is extensive, by advertisement in the public papers*.

Those liable to the assessment, and the manner of apportioning it—By statute 1663, c. 16, the heritors or landholders are subjected to the payment of the one half of the assessment; and the tenants, possessors, or householders, to the payment of the other. In burghs, the power of assessing the inhabitants is vested in the magistrates; and no precise mode of apportioning it is specified. In Edinburgh, the house-rent is made the rule of assessment; and in Glasgow, the tax is levied from the heritable property within the burgh, and the personal funds of individuals, wherever they may be situated, The Court of Session, however, were of opinion, that “the rule adopted in Edinburgh, of making every person pay according to the rent of the house which he inhabits,” was preferable to that of Glasgow, “as affording a *datum* sufficiently accurate, and in no case liable to partiality†.

Provision against neglect of duty in the heritors and kirk-session.—If the heritors and kirk-session in landward parishes, should neglect the important duty of providing for the poor by assessment, the proclamation of the 31st of July 1694, or-

* Hutcheson's Justice of the Peace.

† Case, Lawrie against Dreghorn, December 1797.

ders the Sheriffs, or their deputies, the Justices of the Peace, and the Magistrates of royal burghs, within their several jurisdictions, "to take trial how far, and in what manner, the said acts of Parliament, and proclamations of the Privy Council, have been obeyed, and put to execution, conform to the tenors thereof." In consequence of this power, the quarter-sessions have, in several cases, interposed their authority, to obtain a legal assessment when that was improperly neglected *.

Poor divided into classes.—The law distinguishes the poor into two classes, and appropriates funds respectively to their aid. The first is that class whose wants proceed from a permanent cause; and the second comprises those who require only occasional charity, whether strangers or residents. The proclamation of William and Mary, in 1693, orders the one half of the collections at the churches, to be applied to the fund for the permanent poor; and the other half to be retained by the kirk-session, to meet occasional demands. If the latter, however, shall exceed the one half of the collections, the whole may be appropriated to them, and even, if requisite, a part of the assessment. To entitle a pauper to claim parochial aid, it is necessary to constitute a residence; otherwise, he must be supported by the parish in which he was born.

Objects of parochial charity.—So extensive and humane, indeed, is the practice of parochial charity in Scotland, that it is not confined solely to those who are absolutely disqualified from earning any part of their subsistence, but extends to such persons as widows, who may be left without sufficient provision for their children; and to old men, whose infirmities oblige them to labour at an inferior rate of wages, or whose gains are inadequate to the maintenance of their families; and also, to all those who may require partial assistance.

* Hutcheson, vol. ii, p. 37.

Average expence of the poor.—When compared with the poor's rates of England, the whole revenue for the maintenance of the necessitous poor in Scotland appears very inconsiderable. The average expence of each pauper is about L. 3 Sterling annually. They constitute about the fiftieth part of the whole population; and, accordingly, their number in Scotland being 36,097, the total expence of maintaining them is L. 108,291 Sterling. It must be observed, however, that mendicity very much prevails. The county reporters state, and it is the fact, that the county is everywhere infested with *Strolling Beggars* *. The amount of the sums collected by them must be very considerable, probably not less than the

* *Begging*, whether licensed or otherwise, is not acknowledged by the poor laws of Scotland; but the practice of granting *Badges* as a license to beg, still obtains, in some parts of the country, and particularly in royal burghs. "The statute 1579, which was intended as a general code, and still is the leading regulation concerning every description of poor, anxiously introduced the *legal assessment* as a substitute for *authorised begging*."—*Hutcheon*, v. ii, p. 38. A provision being thus made for the poor, the statute 1661 ordains, that "if any of them so provided, shall go abroad to beg, or otherwise miscarry themselves," &c. they are to be punished; unless it shall be found impossible to collect what is requisite for their "needful sustentation," in which case they might be licensed "to ask and gadder the charitable alms of the parochiners at their awin houses." The act Charles II. P. ii, ch. 18. 1672, which provides for the erection of work and correction houses throughout Scotland, permits begging by such of the poor as are unable to work from age and infirmities, and could not be accommodated in these houses. It ordains, that if the contributions at the parish-kirk "be not sufficient to entertain them, that they give them a *badge* or *ticket* to ask alms at the dwelling-houses of the inhabitants, of their own paroch only; without the bounds thereof they are not to beg." It was intended by this statute, to appropriate the legal assessment to the maintenance of these work-houses, which were never erected, and consequently the law never took effect. This act is now obsolete, and begging with parochial badges is not only unauthorised, but contrary to the general spirit of the poor-laws, as well as the particular directions of the different statutes regarding the provision of the necessitous poor in Scotland; and as no pretence can now be made, that the legal assessment is inadequate to the maintenance of the poor, the conduct of those managers or kirk-sessions, who grant badges as a license to beg, is highly reprehensible.

By the exertions of a most public spirited society established
pose, begging, in the metropolis of Scotland, has l

whole amount of the collections and assessments; and the loss sustained by their pilfering such articles as they can conveniently lay their hands upon, must also be taken into the account; so that the aggregate expence of the poor in Scotland, must greatly exceed what could be inferred from any reference to the parochial funds.

Public kitchens.—Another source of provision for the poor, arises from public kitchens, which, in times of scarcity, are now established in almost every town in Scotland. They are supported by charitable contributions; and the soup, which is made with butcher-meat and vegetables, is distributed among those of the poor who receive tickets of admission from the managers of these institutions.

Friendly societies.—Although friendly societies are not strictly speaking charitable institutions, being associations for mutual relief, founded on the principles of an annuity scheme, yet they deserve to be noticed here, as affording assistance to their decayed members, and also to such as are disqualified from earning their subsistence by temporary sickness. They have been established almost every where in the towns and villages of Scotland, and have tended greatly to relieve the distresses of the lower classes of the community.

Their funds.—The funds of these institutions are raised by the payment of a small sum at entrance, by each member, and by stated contributions monthly, quarterly, or half yearly. When prudently managed, they speedily accumulate; and, in many cases, the happiest consequences have resulted from these establishments. As a labourer, in ordinary circumstances, in regard to health and employment, may easily spare a few shillings annually, it is to be hoped, that these societies will soon become universal, and ultimately preclude the necessity of parochial assistance to the poor, whose wants may thus be provided for, by a permanent fund arising from the savings of their own industry*.

* Some additional observations regarding friendly societies, and an excellent system of regulations, established at Castletown in the county of Caithness, will be found in the Appendix, NO. X.

Private charity.—To receive aid from the parochial funds, is generally considered a disgrace in Scotland; and this opinion, frequently induces the relatives of poor persons to contribute to their support. Private charity also, is, in many instances, extended, to those who are not fully able to support themselves; and liberal contributions by the opulent, are occasionally made, which are altogether sources of maintenance for the poor, that prevent many of them from becoming a burden on the common fund.

Comparison between Scotch assessments and English poor's rates. Although regular assessments have taken place in some parts of Scotland, yet the nature of the poor-laws does not admit their establishment on the same footing as the poor's rates in England. The latter are permanent, and liable, it has been said, to great abuse; but the assessments in Scotland are temporary, and made only when occasion requires, in consequence of the insufficiency of the ordinary funds of the parish; and mismanagement has never in any instance been imputed, to those respectable individuals who superintend the collection and distribution of the poor's funds. Besides, regular assessments have been only partially introduced, being mostly confined to those counties which border with England; and the extent to which they are carried, has not hitherto been considerable.

WORK-HOUSES.

Act relative to them and their object.—The erection of *work or correction* houses in the different counties of Scotland, was ordained by the statute of Charles II. ch. 18, 1672, which specifies 32 towns, where such houses were to be erected. The object of the act was, to suppress vagabonds, and to prevent begging by persons who were able to labour; and the legal assessments of the parishes, were to be applied to the support of these institutions. The statute, however, was not put in execution, and there are few work-houses in Scotland; but where they have been established, they are appropriated to the helpless poor; and houses of correction for vagabonds,

termed Bridewells, of which there are four in Scotland, have been erected under different enactments *.

Expence of poor's-houses.—In the poor's-house of Dumfries, at Martinmas 1809, there were 4 men, 17 women, 18 boys, and 7 girls; in all 44; 26 widows received annual pensions, and 30 poor householders received small pensions weekly. The total expence for the year preceding was L. 606 : 17 : 0 $\frac{1}{2}$. In the Poor's Hospital of Paisley, there were in 1811, and the three previous years, 557 persons in all, whose aggregate expence was L. 5234 : 0 : 5 Sterling, or at the rate of L. 9 : 7 : 11 each annually; but their work amounting to L. 328, is to be deducted, which reduces the expence of each to L. 8 : 16 : 1 Sterling yearly. In the city of Aberdeen, the poor's-house contains 40 boys, with one master, one housekeeper, and three female servants. The yearly expence of this establishment, for provisions only, on the average of seven years, (from 1806 to 1812, inclusive), was L. 238 : 19 : 4 $\frac{1}{2}$; or for each person annually L. 5 : 6 : 2 $\frac{1}{2}$ Sterling. During this period, the price of oatmeal, which constitutes the chief part of the food of the boys, was on an average L. 1 : 0 : 10 $\frac{4}{7}$ per boll. In Gordon's Hospital, also at Aberdeen, the maintenance of each boy, for the above period, has been L. 6 : 11 : 5 $\frac{1}{2}$ each yearly, including teachers and servants. When the other necessary expences attending these institutions are added, it will be found, that the average of each will amount to about L. 8, 10s. yearly in the poor's-house, and to about L. 10 Sterling in Gordon's Hospital. In Edinburgh, the expence of the poor's-house, according to Dr Macfarlane's *Inquiries concerning the poor*, published in 1782, amounted annually, on the average, to L. 4, 10s. Sterling each person. The whole earnings of a labourer, at that period, were calculated at L. 15 a-year, after deducting house-rent. Supposing his family to consist of five members, the allowance to each for maintenance, clothes,

* There are four Bridewells in Scotland, viz. one at Edinburgh; one at Glasgow; one at Greenock; and another at Aberdeen. They are supported by assessments, and authorised by special acts of Parliament.

&c. is only L. 3 Sterling. Hence it appears, that the family of a labourer, may be supported at a less expence, than even what is required for the same number of persons within a work-house. It is stated, that in England the expence of each pauper in a work-house amounts to L. 15, 15s. while the wages of a labourer are rated at L. 31, 10s. Sterling yearly.

SECT. IX.

POPULATION OF SCOTLAND.

The general law on which population depends.—The principles on which population depends are simple, and may be reduced to a single axiom, which is, *that mankind will increase in proportion to their comfortable subsistence.* This law indeed regulates all animated life; and it is justly remarked by Dr Franklin, “That there is no bound to the prolific nature of animals and plants, but what is made by their crowding and interfering with each other’s means of subsistence.”

Tendency to exceed subsistence.—If the deficiency of food, therefore, has set a natural boundary to the increase of animals and vegetables, and the fact cannot be denied, it follows, as a necessary consequence, that there must exist, in both, a constant tendency to propagate their species beyond the limits of subsistence. That such is the case, has been repeatedly acknowledged; and, since the commencement of society, the effect has been illustrated by the uniform experience of mankind. Although the seeds of life be profusely scattered, yet their means of reaching maturity are confined, and necessity restrains their progress. “The race of plants, and the race of animals,” says Malthus, “shrink under this great restrictive law; and man cannot, by any efforts of reason, escape from it.” Hence his life is subjected to a constant

succession of good and evil, alternately operating upon him by cause and effect, which no human ingenuity can either alter or avoid.

Checks to population.—There are, it may here be observed, two powerful checks to population. The first is *natural*, arising from the deficiency of food; it is interwoven in our destiny; and presents an insurmountable barrier to the increase of the species, beyond certain limits. The second is *artificial*, proceeding chiefly from the vices of mankind, and the imperfection of their civil institutions; and although not so definite as the first check, it still retards the increase, as well as the amelioration of the human race, and operates in various ways to destroy the pleasures of their existence.

Ratio of increase in regard to man and plants.—Were there no checks to population, the number of our species would augment in a *geometrical* progression, corresponding to 2, 4, 8, 16, 32, &c. every twelve or fifteen years, as evinced by the rapid increase in several of the districts of the United States. While population advances geometrically, subsistence, on the other hand, can only be increased in an *arithmetical* ratio. By no power of tillage could an acre of land be made to double its produce every fifteen years. By the experience of ages, indeed, it has been ascertained, that, under the most favourable circumstances, the produce of the old cultivated soil cannot be greatly augmented, whilst the improvement of unproductive land, is in general attended with much difficulty and expence. Were it otherwise, however, and could the ingenuity of man increase the productions of the vegetable kingdom even in a ratio corresponding to 1, 2, 3, 4, 5, &c. still the deficiency of food must check the progress of population, which so far surpasses, on this calculation, the productive power of the earth.

Theory of population confirmed by experience.—The law which restrains our species within the bounds of subsistence, is, in theory, sufficiently obvious; and although its practical effects are less evident at first view, being concealed by the difficulty of obtaining accurate information, yet our expe-

rience of the slow progress of population, in the old states of Europe, demonstrates the infallible influence of this principle.

In regard to Scotland in particular, it may be observed, that about the year 1250, in the reign of Alexander III, the number of the inhabitants in Scotland was estimated at only 600,000; and that, after his death, the wars during the government of Wallace, and the reigns of Baliol and Bruce, both deeply affected the wealth, and diminished the population of the kingdom, for a long period afterwards. The wars with England, joined to the feuds of the clans, next retarded any material increase till the union of the two crowns—and from war, famine and pestilence, no considerable addition was made, till after the union of England and Scotland in 1707. Indeed, such were the effects of these circumstances combined, that the population in 1755, was only double what it had been five hundred years before. By the extension of commerce and manufactures, however, which occasioned a greater demand for the produce of the soil, and kept pace with the improvements in agriculture, the population of Scotland is, at this time, thrice as great as it was in the reign of Alexander III, double what it was at the death of William III, one half more than what it was on the accession of George III; and, notwithstanding emigrations to America, and long continued wars in Europe, it has increased one-eighth part in the course of the last ten years.

The increase however varies in different parts of the country. For the purpose of pointing out the districts where that increase has taken place, it is proposed to range the whole into three classes or tables; the first, containing the thirteen counties south of the Friths of Forth and Clyde; the second, the fourteen counties in the middle division of Scotland; and the third, the six northern counties, with the islands attached to them.

The 1st column contains the names of the counties; the 2d, their extent in square miles; the 3d, the population in 1753-5, as ascertained by Dr Webster; the 4th, the number

of inhabitants at that period to the square mile; the fifth, the population in 1791-5, as contained in Sir John Sinclair's Statistical Account of Scotland; the 6th, the number of inhabitants to the square mile at this second period; the 7th, the population in 1801, as ascertained by Mr Abbot's bill; the 8th, the number of inhabitants to the square mile at this third period; the 9th, the population as found in 1811, in consequence of a similar act of Parliament; and the 10th, the number of inhabitants to a square mile at that last named period.

I. SOUTHERN DIVISION.

Counties.	Sq. m.	1755.		1795.		1801.		1811.	
Roxburgh	715½	31,273	44	32,020	45	33,682	47	37,230	52
Berwick	442	24,946	56	30,875	70	30,621	69	50,779	70
Haddington	272	29,709	109	28,966	106	29,986	110	31,164	116
Edinburgh	354	90,412	255	122,655	346	122,951	347	148,444	419
Linlithgow	120	16,829	140	17,570	146	17,844	149	19,451	182
Peebles	319	8,908	28	8,107	26	8,735	28	9,935	31
Selkirk	264½	4,368	17	4,514	17	5,071	19	5,889	25
Dumfries	1265	41,913	33	52,329	41	54,597	43	62,962	50
Kirkcudbright ..	834	21,205	25	26,959	32	29,211	35	35,634	40
Wigton	459	16,466	36	20,983	46	22,918	50	26,891	59
Ayr	1045	59,009	57	76,035	72	84,306	81	103,934	99
Renfrew	227	26,645	117	62,853	277	78,056	344	92,596	408
Lanark	945	81,726	87	125,251	133	146,699	155	191,752	204
South. Division,	7260	453,409	62	607,920	84	664,679	92	794,659	109

II. MIDDLE DIVISION.

Counties.	Sq. m.	1755.		1795.		1801.		1811.	
Dunbarton	259	13,857	53	18,408	71	20,710	80	24,189	93
Stirling	502	38,813	77	46,664	93	50,828	101	58,244	116
Clackmannan ..	48	9,003	188	8,719	182	10,858	226	12,010	250
Kinross	79	4,889	62	5,102	67	6,725	85	7,245	92
Fife	470	81,570	174	87,250	186	93,743	199	101,272	217
Perth	2638	118,903	45	153,274	50	126,366	48	135,085	51
Forfar	892	68,297	76	91,001	102	99,127	111	107,264	120
Kincardine	382	24,346	64	26,99	6	26,749	69	27,439	72
Aberdeen	1970	116,886	60	122,921	63	123,082	63	156,903	70
Banff	647	46,531	56	38,487	59	35,809	55	34,100	53
Elgin	480	28,934	60	26,080	54	26,105	56	28,108	56
Nairn	198	5,694	28	7,054	31	8,257	41	8,251	41
Argyle	3210	63,291	19	76,101	24	71,859	22	85,688	27
Bute	165	7,125	45	11,072	67	11,791	71	12,055	73
Middle Division,	11940	618,079	52	698,161	58	712,207	59	777,736	65

III. NORTHERN DIVISION.

Counties.	Sq. m.	1755.	1795.	1801.	1811.
Inverness	4245	64,656 15	73,979 18	74,292 18	78,415 19
Robt and Cromarty	2975	47,656 16	55,430 19	55,840 19	60,853 20
Sutherland	1801	20,774 11	22,961 13	23,117 13	23,629 13
Caithness	697	22,215 32	24,802 36	22,609 33	23,419 34
Orkney and Zetland	1320	38,591 29	43,239 33	46,824 35	46,153 35
Northern Division...	11038	193,892 17	220,411 20	222,182 20	232,469 21

RECAPITULATION.

Counties.	Sq. m.	1755.	1795.	1801.	1811.
South. Division,	7260	453,409 62	607,920 84	664,679 92	794,659 109
Middle Division,	11940	618,079 52	698,161 58	712,207 59	777,736 65
North. Division,	11038	193,892 17	220,411 20	222,182 20	232,469 21
Total	30238	1,265,380 42	1,526,492 51	1,599,068 53	1,804,864 60

From the above Tables it appears, That the southern division, (notwithstanding the great extent of the pastoral district, and of the mountains near the English border), contains, in *two-ninths* of the total surface, nearly *four-ninths* of the population; and that notwithstanding the far greater extent of the Grampians, and other mountains in the interior, and of the Argyleshire mountains, which approach to the Atlantic, the average population of the middle division, is considerably above the general average of Scotland, and is nearly three-fifths of the population of the southern division; but that the northern division, with considerably more than a third of the extent, contains only about an eighth part of the population, or only 21 persons on the square mile; while the middle division contains 65, the southern 109, and the average population of Scotland, owing to this deficiency in the northern division, is only at the rate of about 60 persons *per* square mile.

The great deficiency of population in the six northern counties, has been unjustly ascribed solely to emigration. The true cause is, the small proportion of arable land; as will be easily seen by looking back to the tables in the

first chapter. Only about 900,000 English acres, (by the Tables exactly 917,087 acres), are under cultivation. Hence there is always a redundancy of population; and when the inhabitants go to the Lowlands, to England, or to other countries, as individuals, *it is not observed*; but when any families go to America, deluded by artful men, a clamour is raised about emigration, as if the country were depopulated. Yet, in fact, except in Orkney and Zetland, where there is only an English acre of arable land to each inhabitant, and where the number is stationary, the population is every where increasing. In Sutherland, indeed, within the last ten years, the increase is only at the rate of two, and in Caithness of four in the hundred, partly owing to the great drain from these countries during the long continued war. But in Inverness it is above five; and in Ross and Cromarty, it is, within the last ten years, above thirteen in the hundred, though these have been the districts, from which emigration has attracted most general notice; and where, from 1793 to 1801, it prevented their increase, rather than diminished the number of resident inhabitants. The British Parliament, with a liberality, equally generous and politic, has, by forming the Caledonian Canal, and by advancing half the expence of roads and bridges, taken the best course for preventing emigration, and promoting the prosperity of the Highlands. The proprietors will thence be induced, to reside more generally on their estates, than otherwise might be the case, and they will thus be enabled, more effectually to promote the prosperity and improvement of those remote districts.

CHAP. XVII.

ON THE OBSTACLES TO THE IMPROVEMENT OF LAND IN
SCOTLAND ; AND THE ENEMIES INJURIOUS TO THE
FARMER IN HIS PROFESSIONAL PURSUITS.

PART I.

OBSTACLES TO IMPROVEMENT.

BY THE REV. ROBERT RENNIE, D. D.

MINISTER OF KILSYTH.

To point out the obstacles which stand in the way of the improvement of Scotland, and to explain the means by which they may be, either altogether, or in part removed, is the object of this Chapter.

Such a task would have been above the power of any one individual in the kingdom fully to accomplish, had not the Reports of the several counties, published under the sanction of the Board of Agriculture, contained such an interesting collection of authentic facts, connected with this important inquiry, beyond what was ever made at any former period, by any nation, and greater than ever could have been collected, by any one individual.

From a careful perusal of these reports, it appears, that the obstacles to improvement, of a general nature, originate from, 1. Want of capital ; 2. Want of leases ; 3. The short-

ness of leases; 4. Improper restrictions in these leases; 5. The time and manner of letting land; 6. Entails; 7. Want of roads, and other means of communication; 8. The want of disseminated knowledge; and, 9. Defective agricultural police. Several of these particulars have been touched upon in the preceding parts of the Report; but it was thought desirable, in this branch of the work, to give a general and connected view of the whole.

These obstacles are certainly material, but they are not to be put in competition with those which exist in other countries; and, fortunately, they are in general capable of being either greatly alleviated, or altogether removed*.

SECT. I.

WANT OF CAPITAL.

THE want of sufficient capital was long felt over all Scotland, as a bar to improvement. Of course, for many centuries, agriculture was at a stand. Happily, however, this is not now the case, in several parts of the kingdom. On the contrary, in the more cultivated districts, the capital of the farmer is adequate, not only to every purpose of common cultivation, but every improvement he has occasion to adopt. Yet, in many counties, the want of sufficient capital is still felt as an evil, and may be fairly stated as an obstacle to improvement. Unfortunately also, it prevails most, where there is the greatest quantity of land, which it is necessary, either to cultivate more effectually, or entirely to reclaim. It is superfluous to

* In regard to those obstacles which are of a local nature, being of minor importance, and not generally felt, it is proposed to give an account of them in an Appendix.

state minutely, how this evil operates; it must be obvious at one glance.

As a proof of the effects of capital, in a general point of view, we need only turn our eyes to East Lothian, and Berwickshire. For half a century past, capital, skill, and industry, have all combined, to meliorate the soil of these favoured districts. The consequences are great and apparent. The produce within that period has greatly multiplied. The rents have risen considerably, and are still rising. Continual accessions have been made to the capital of the farmers. Improvements of the most permanent nature have been carried on, and are still continued, to the greatest extent. Rich crops of wheat are now reaped, where nothing but heath was formerly seen; and every where scenes of abundance and prosperity are to be observed.

On the contrary, in other districts, where capital has been wanting, though the soil, in its original state, was equally good, perhaps in some cases better; though the industry of the farmer has been great, and the climate favourable: yet, from the want of this one essential ingredient of all improvement, nothing but sterility, poverty, and wretchedness, are to be seen. Where capital in such cases is wanting, it is obvious, that the tenant cannot possibly undertake any expensive improvement, such as levelling, draining, clearing the ground of stones and other obstructions, or even manuring, to the extent which is requisite for rendering his farm regularly productive, and bringing it into the highest state of improvement.

If want of capital be really an obstacle to improvement, and if this island must be improved, in order that it may subsist its increased and increasing population, the remedy is obvious:—"Let more of the capital of the nation be invested in agriculture." But how is this to be accomplished? Is it by lending money to that most useful and necessary class of men, the industrious farmers? This is not always safe; nor would it always answer the end. Many could not give any

adequate security for the money advanced. Some, from the want of skill in agriculture, would not employ it to the best advantage ; whilst others would make an improper use of such an indulgence. How then is this great, this necessary end, to be attained ?—Either by the landed proprietors, executing great improvements themselves, or by their lending money to, or assisting the credit of, those farmers, in whom they can confide. Many landholders are possessed of a floating capital ; and all of them have credit to a greater or less extent, excepting those who are unfortunately bound down by the fetters of a strict entail. Even in this case, some means might be suggested, by which landlords may be enabled to give pecuniary assistance to their tenantry.

There are various improvements, also, which in a peculiar manner, are in the province of proprietors, and which they alone can execute. The erection of substantial and convenient farm-houses and offices is of this description. The making of extensive drains, which reach over a variety of farms, cannot, and ought not to be executed by tenants. Embankments, and straightening of rivers, are of the same nature. Yet if all these were done, (which the improvement of the country requires), vast tracts of rich land might be recovered, and extensive regions rendered productive. Inclosing, planting, trenching, and clearing the land of stones and rubbish, as well as reclaiming moors and mosses, are all operations more appropriate to a landlord, than to the tenant.

Were all, or most of the floating capital of the proprietors in Scotland, sunk in such operations, with judgment, the want of capital among their tenants would be much less felt.

It is far from being intended to insinuate, that the whole capital of this kingdom should be vested in agricultural improvements ; far less that commercial industry should be discountenanced. On the contrary, these two united, are the strength of Scotland ; and, like twin brothers, should be equally cherished. But surely agriculture is the most natural

and beneficial employment of the landed interest; and were their whole capital and exertions employed on agricultural improvement, the soil would be rendered more productive; and Great Britain would soon become independent of strangers or enemies, for the necessaries of life.

If, with this view, every proprietor were to set a pattern of improvement to his tenants; if his heir-apparent were early trained to such pursuits; if he received a liberal education, and acquired a thorough knowledge, not only of agriculture, but of all the arts connected with it, he would then be prepared, to enter on the possession and improvement of his paternal estate, with advantage to himself, to his successors, and to the public.

SECT. II.

WANT OF LEASES.

THOUGH the State watches over all ranks of subjects with parental solicitude, and protects the person and property of the peasant with equal care, as that of the prince or the nobles, yet the interests of agriculture have been, in many points, overlooked, both by the landed proprietors and the legislature. The tenure by which some tenants hold the possession of their farms, furnishes too decisive a proof of this observation.

In numerous cases, that tenure is so slight, and of such short duration, as to throw an insurmountable bar in the way of improvement. In various parts of Scotland, many farmers are merely tenants at will. This is chiefly the case in the northern counties, and in the western and northern islands. The depressed and deplorable state of such tenants, is thus described in the agricultural report of one of these

districts. "The greater number, by far, of the occupiers of the soil, have no lease at all; and unless they are submissive in the performance of every species of drudgery, and, seemingly past feeling, disposed to bear, with patience, every exaction, however arbitrary, or capricious, or oppressive, they are turned off at the first term of removal *."

Where land is occupied by such a degraded race, it must remain, comparatively speaking, sterile. No exertion can be made, no improvement attempted, far less executed, by the tenant who has only a yearly tenure. As to subtenants, who are at the beck of *tacksmen*, or *middlemen*, their condition is still more deplorable than even those who are at the will of a landlord. Their spirits are completely broken, and every exertion paralysed.

The consequences of such a deplorable system are obvious. The tenant is debased, and enslaved. Agriculture is neglected. The property of the landlord is deprived of every species of improvement: and if all Scotland were but for twenty years held by such a tenure, it would be unable to subsist one-half of its existing population. The remedy for these evils is obvious. Let every tenant, whose character is unexceptionable, and whose circumstances are adequate to what he undertakes, obtain a lease of his farm; and let every encouragement be given to improve it, and to render it productive.

SECT. III.

SHORT LEASES.

IN general, the length or duration of leases, ought to bear some proportion to the capital and labour necessary for commencing and carrying on the operations of husbandry.

* Inverness-shire Report, 237.

There are certain farms, which require but little labour or expence for these purposes, hence they may be occupied to advantage, even on a lease of moderate duration : Sheep-farms, or such as are used solely for pasture, are of this description. Yet, even in such cases, it would be better to grant a long lease, with a rise of rent at certain periods, than a short one, This would prevent the tenant's continually shifting from place to place, and changing his stock from time to time, by which his interests must be materially injured.

Even in arable farms, which are already much improved, and in a high state of cultivation, long leases are less necessary, because it requires less labour and expence to crop them. In this case, little adventitious manure is wanted ; no expence in draining, fencing, or new forming of ridges, is required ; fewer men and horses need to be employed ; and, in the course of ten or twelve years, the tenant may have an adequate return for his outlay, and ample profit on his bargain. Yet still it would be preposterous, on these accounts, to limit the duration of his lease to a short period. For it is clear that such a farm, by shifting its tenant every twelve or fifteen years, in place of advancing in fertility, must be injured. In spite of all the regulations that ever were, or can be devised, and the strictest rotation of crops that can be imposed on the tenant, he has it still in his power to scourge his farm, and to render it less productive when he leaves it. It is evident, therefore, that a short lease is an obstacle to the improvement even of such a farm, and that it never will reach the highest state of productiveness of which it is susceptible, while it continues to be held by such a tenure.

But there are few farms in Scotland, perhaps there is not one in a thousand, in such a high state of cultivation ; and if short leases, even in these few and favoured spots, operate as a bar to improvements, they must operate tenfold more powerfully where the lands are unimproved. Such a farm as requires to be inclosed, drained, levelled, limed, and cleared of stones and other incumbrances, can never be cultivated to

advantage, far less improved, on a lease of short duration. No farmer of prudence, would, on such a tenure, undertake any one of these expensive and permanent improvements; since, before he could reap any advantage from them, or even be reimbursed for his labour and outlay, his lease would have expired. It would be unreasonable therefore to expect, (and still more to bind down any tenant to undertake), such improvements, unless his lease were prolonged to such an extent, as to give him the fair prospect, not merely of being reimbursed, but of reaping a fair profit on his expenditure.

To remove this obstacle, has accordingly been the object of many landed proprietors in Scotland. Indeed, over a great part of that kingdom, leases of sixteen, nineteen, and twenty-one years or more, have been granted, to the mutual advantage of all parties concerned, and to the benefit of the public. For if we take a view of the kingdom at large, or consult the agricultural reports of it, we uniformly find, that wherever such leases have been granted, extensive and permanent improvements have been executed, and the value of landed property and the produce of it have increased apace: Whereas, in those districts where no leases, or leases of short duration, have been granted, no permanent improvements have been attempted, and, of course, the value of land, and the produce of it, have either risen slowly, or not at all.

In regard to the precise duration of a lease most proper for all parties, different opinions have been entertained. Proprietors, in general, think that nineteen years are long enough; whilst the greater part of tenants think that period rather too short. By some, plans for prolonging leases to a much greater length have been suggested. The late Lord Kames, indeed, proposed a plan, by which perpetual leases might be granted. He assumed it as a *postulatum*, that the proprietor and tenant have it in their power, to form a tolerably just estimate of the value of any farm, for such a space of time as twenty-one years. Supposing that both parties agree that L. 100 Sterling is a reasonable rent for that period, his Lordship

proposes, that a rise of rent shall be fixed for the next twenty-one years, proportioned to the rise on the value of land and its produce. And upon this additional sum, say L. 20, being stipulated for, an addition of twenty-one years is given to the lease. But as this sum may be found to be too great, and more than the tenant can afford to give, he is allowed an option to resign his lease, on giving the landlord intimation of this his intention, a year before the first term expires. If no such intimation be given, then the tenant is bound to pay this additional rent for the term first fixed upon.

It may happen, however, on the other hand, that this L. 20 of additional rent, may fall short of the value of the farm; or the proprietor, at that period, may have urgent reasons for resuming the possession of it. In this case, he recommends the following plan of accomplishing this object, without injury to the tenant. As a great proportion of the additional value and produce of the farm, may be owing to the exertions of the tenant, who has expended much money in improving it, in the hopes of holding his possession for a second period, it is reasonable that he should have adequate remuneration, on condition that he is to relinquish his lease. His Lordship, therefore, proposes, that, in this case, the proprietor should pay from five to ten years' purchase of the additional rent, as a remuneration to the tenant for relinquishing the farm.

But rather than remove, the tenant may be willing to pay, in place of L. 20,—L. 30 additional rent. In this case, his Lordship proposes, that the landlord shall either be obliged to accept of this additional sum, or to pay also five or ten years' purchase of this additional L. 10 to the tenant.

In this way, Lord Kames supposes, that the landlord would always be certain of receiving the full value of his farm, whatever circumstances might arise; while the tenant would have security for the possession of it for a long period, or of adequate remuneration, in case he was called on to relinquish his lease. Hence he would have no temptation to relax his exertions in improving his farm.

By stipulating, in the same manner, for a certain fixed rise of rent at the second, third, fourth, or fifth termination of each period of twenty-one years, under similar reservations to both parties, his Lordship supposes, that a lease may be prolonged in perpetuity, without injury to either of the contracting parties, and to the great advantage of the public. For the tenant, in such a case, is encouraged, not merely to commence permanent improvements, and then relinquish them, but to continue to improve his farm, in the fair prospect of receiving ample remuneration for all his labour and expence. So that, in this case, all land thus possessed, would be in a progressive and perpetual state of improvement; and tenants of this description, would form a most useful, honourable, and independent class of men, holding a middle station between the proprietors and other tenants.

Perhaps the plan of a perpetual, or a long lease, might be framed on the following data.

Suppose a farm of 200 acres to be altogether arable, and that the fixed rent of it is L. 500. In place of binding the tenant to pay this fixed sum, in all time coming, let him be bound to pay a rent that varied with the price of corn. Thus, if the specified rent was 60 bolls or quarters of wheat, 80 of barley, 80 of oats or oatmeal, 50 of peas or beans, or any other given number of these articles, let him become bound to pay their price yearly, during all the time of his lease, according to the medium *fiars* of the county, in which the farm is situated. In this case, as the rent would rise or fall, in proportion to the value of the produce, a lease might be prolonged to a considerable period of time. It is proper, however, to state, that this mode of payment has been constantly opposed by the tenantry, on the ground, that it subjects them to the highest rent, at the time when their farms are least productive. When the rent is fixed in money, this cannot be the case, the deficiency of produce being made up, by the increased price obtained in the market. This objec-

tion, however, might be obviated, by fixing the rent at the average price of grain for ten or twenty years *.

* The following clause of a lease for regulating the rent of arable land, by the average price of corn, is recommended by Dr Coventry.

“ Farther, seeing that the principal reason for granting a lease to endure for the period of (nineteen, twenty-one, or any other number of years), is to encourage a tenant to execute improvements of a more effectual nature, and in a better manner, and thereby to enable him to pay a fuller rent, than he could do with a short or uncertain term of possession, and seeing that it is also an equitable object to prevent both landlord and tenant from suffering loss at an after period, from any striking change occurring in the relative value of money and land-produce, particularly corn; it is therefore stipulated, that if, during the first seven years of this lease, the average price of corn, namely, *wheat, barley and oats*, according to the fiars of the shire of _____, shall be different from its average price, according to the said fiars, during the seven years immediately preceding the commencement of the lease, which were as follows, (here state the prices of each sort), then, and in that case, the rent of each of the second seven years of the lease shall vary, that is, be increased or diminished accordingly; and if, during the second seven years of the lease, the average price of the same species of corn by the said fiars, shall be different from its average fiar price during the first seven years of the lease, then, and in that case, the rent of each of the remaining years of the lease shall in like manner vary, that is, be increased or diminished accordingly *.”

By such a clause, the rent, or any proportion of it that the parties choose, would come, in the progress of a lease of ordinary endurance, as nineteen or twenty-one years, to be regulated by the prices of corn. If the word *accordingly* be used, it will, after the first seven years, have much the same operation as a rent wholly of corn, not however delivered in kind, but converted into money by the average fiar prices during a term of years, (whether seven, ten, or any other number); and if, instead of the word “*accordingly*,” the following expressions are substituted, “*in the proportion of one-half (or three-fourths, or one-third, or two-thirds, or any other proportion which the parties may agree on) of the difference between the averages*,” then not the whole rent, but *any proportion of it*, would be regulated in a similar manner, by such average fiar prices of corn.

* Or else, “*in the proportion of _____ of the difference between the average fiar prices, during the said first seven and the said second seven years of the lease.*”

SECT. IV.

IMPROPER RESTRICTIONS IN LEASES.

A VARIETY of restrictive clauses have been introduced into leases, some of which cannot be objected to, whilst others have been found impolitic, unjust and oppressive.

1. A regular and rigid rotation of crops has been frequently introduced into leases, which, fifty years ago, might have been necessary in many parts of Scotland, more especially in those districts, where agricultural knowledge was most deficient, and where obstinacy and prejudice prevailed among practical farmers. Before that period, it was by no means uncommon, to take two, three, four, or even five white crops in succession. By this means the richest land was ruined, overrun with weeds, and where it was severely cropped, more especially after being limed, was reduced to a *caput mortuum*. To restrict such tenants to a regular rotation, was necessary, and equally advantageous to the landlord and tenant. In those districts, however, where agriculture is better understood, and where a regular rotation of alternate green and white crops has been already introduced, such restrictive clauses are no longer requisite, at least at the commencement of a lease. Intelligent farmers indeed, are so fully persuaded of the advantages of such a rotation, that they would not, though it were in their power, deviate from it. Hence, in the more improved districts, fewer restrictions in regard to the rotation of crops are introduced into leases, and at the commencement of his lease, or rather during four-fifths of the period for which it is granted, the tenant is in general left free from restraint.

Where a contrary system is adopted, it may be justly considered a bar to improvement.

There are stipulations also, which are most justly complained of, as productive of the same injurious consequences. It is sufficient to name a few of them. In some districts, the tenant becomes bound, at the commencement of his lease, to build or repair farm-houses and offices on the farm, and to put the fences in good order, or at least to collect and carry materials for these purposes. For the former, he is sometimes allowed remuneration at the expiration of his lease; for the latter, seldom, if ever. But though he were paid the full amount of building, repairing, and carriage, on the very day the work was finished, still such a stipulation is oppressive, and proves a great obstacle to improvement. For if any plan for meliorating the soil, or improving the farm, is intended to be adopted, it ought to be, and generally is undertaken, at the very commencement of a lease. At that period, all the time and talents, all the labour and capital of the tenant, ought to be exerted for these purposes. In place of this, he is wholly occupied in building and repairing his houses, and putting his fences in order; and much of his little capital is thus sunk, while his men and horses are entirely occupied in collecting and carrying materials for these purposes. His farm, in the mean time, must remain in its original state; and all his plans of improvement must be postponed or frustrated.

There are stipulations of a still more oppressive nature, to which tenants are called upon to submit, such as the following, extracted from the Reports printed by the Board.

“Where any ditches, or drains, or water-runs, form, or are necessary as a part of a general drainage for other farms, or for a district of the estate, the whole tenants, having such drains passing through, or along the boundaries of their farms, shall be obliged to clear them at the same time, if the factor on the estate shall deem such clearing to be necessary.”

Again,—“In case the fallow crops shall be foul, or weedy, the tenant, *at the desire of the proprietor*, must plough them up, and turn them to a real fallow.”

It is surely impossible for any humane or prudent proprietor, to enforce such stipulations ; and, indeed, no tenant of common sense, would subject himself to such clauses in his lease, by which he is exposed to the caprice of his landlord, and, what is worse, to be oppressed by an unfeeling factor or agent.

There is another restriction, which is so general, and operates so powerfully as an obstacle to improvement, that it demands more particular consideration.

In nine leases out of ten, the tenant is restricted from selling or subletting his lease, or alienating it in any shape ; a restriction which, in every case, is complained of as inequitable, and, in some cases, becomes peculiarly cruel.— For instance, an enterprising farmer, after laying out great sums in judiciously improving a farm, dies suddenly, leaving a widow and several young children, perhaps daughters, who cannot manage the farm. In this case, if the lease cannot be disposed of, the family of an active and useful improver may be ruined.

In general, it is clear, the more capital that is sunk, and the greater labour that is bestowed in improving any farm, the greater is the hardship of such a restriction. The best farmers, therefore, and the greatest improvers, complain most loudly of it : Whereas tenants who have least capital, and bestow little labour and expence in meliorating their farms, feel this evil less. As a proof of this, we need only look into the County Reports. In East Lothian, where improvements are carried to the highest pitch, and where most capital and labour have been sunk, we hear the loudest complaints of such a restriction. The author of the Report of that county, complains of it as the first and greatest obstacle to improvement. He reasons in the following manner. Let the public judge whether that reasoning be fair and conclusive.

“ It may be laid down as a first principle, that whatever deters the tenant from laying out his capital on his farm, operates as an obstacle to the improvement of it. The mer-

chant and manufacturer lay out their capital without hesitation, because they know it is liable to no other risk than what results from the ordinary hazard of trade: And it is this that causes trade to flourish. If the cultivator of the soil had no other danger to apprehend, than that which results from bad seasons, he would lay out his money with equal confidence. But if he labour under disadvantages peculiar to that profession, he is not placed on an equal footing with other traders.

“ One of the *first* and *greatest* obstacles to improvement, in this country, is, that the farmer has no power to dispose of his lease. It is understood, that, by the common law of Scotland, he has no liberty to relet his farm, unless it is expressly secured to him in his tack. On abstract principles, nothing appears more absurd or unjust. The shopkeeper may let his shop, deliver over his goods to his successor, and take a sum of money for giving up to him an established business. On what principle ought the farmer to be prohibited from transferring his established business to another, for a valuable consideration? Why should not he be permitted to relet his farm, sell his stock, and put another in possession to that trade, from which he chooses, or finds it absolutely requisite, for him to retire?”

But to all this it may be objected, that, by allowing a tenant to relet his farm, or sell his lease, you give him a choice and selection which ought to belong to the proprietor. You lessen, too, the security the landlord has for his rent; and, if the tenant is to reap all the advantage of such a right, injustice is done to the landlord. To this it is replied, 1. That every landlord ought to have the choice or selection of his tenant, even in case of a sale or sublet. 2. That the landlord's security ought never to be diminished, by allowing the tenant such a privilege. And, 3. That the tenant is not entitled to reap all the rise of rent of his farm, in case of a relet. For, though this additional rent may be chiefly owing to the labour, exertions, and capital of the tenant, it is not

entirely so. *It may in all cases be partly, and in some chiefly, owing, to the rise of the value of land.* To a certain moderate *per centage*, therefore, (say 5 *per cent.*), of any additional rent to be obtained, when a farm is sublet, the landlord has a claim, after the first ten years of the lease has expired, where the value of land has risen. Thus, under proper reservations, all restrictions against selling or subletting farms may be removed. Great advantages would thence accrue to the tenant in all cases; and great and necessary relief would be given in others, while justice would always be done to the proprietor.

SECT. V.

THE TIME AND MANNER OF LETTING LAND*.

PROPRIETORS too often delay the renewal of the leases of their farmers till the former lease is almost expired. This is obviously injurious to both parties, and proves often a great obstacle to improvement. It is injurious to the tenant; for it keeps him for some time in a state of painful suspense and anxiety. The landlord, too, is injured, for nothing is generally done, during this period, to improve his property. It is well known, that every judicious tenant makes the greatest exertions at the commencement of his lease. But the more he expends at that time, the less will he be disposed to lay out during the latter years of it, especially if he has reason to fear, or knows with absolute certainty, that his lease is not to be renewed to him, but given to another.

The remedy for the evil complained of is obvious, and it

* The term of entry is also a subject of much importance. It should always be to lands and houses, on the 11th of November. See *Husbandry of Scotland* vol. ii, p. 172.

is in the power of every proprietor to apply it, without risk to himself, and to the greatest advantage of the empire at large. In place of allowing every lease on his estate to expire before a new lease was granted, he ought to settle terms with every tenant of capital, skill, and industry, four, or at least three years, before the expiration of his lease; nay, he ought to conclude the bargain at least two years before that event can take place.

The *manner*, as well as time, in which land is let, is also complained of. In place of contracting with the tenant in possession of the farm, it has become a general practice, to advertise it within a short period of the expiration of his lease. Sealed offers are called for from all who choose to make application; and a promise is frequently held out, that the offerer's name shall be concealed. In some cases, this plan is highly advantageous to the public, and may be the mean of promoting, in place of proving an obstacle to, improvement. In those districts where agriculture is in its infancy, through the ignorance, indolence, or obstinacy of the farmers in general, or of any particular tenant, or where a want of capital is generally felt, such a plan may be advisable. For, to continue such a class of tenants, would be injurious to them, to the landlord, and to the public at large. Whereas, to call in a more active, intelligent, and industrious class of farmers, with larger capitals, would be the immediate interest of the proprietor, and greatly promote the improvement of the district. Even in cases where two or more small farms are judiciously thrown into one, and where none of the tenants have capital to stock, or skill to conduct such an extensive establishment, it may be necessary, or at least highly expedient, to adopt the plan above suggested. At any rate it may be prudent to advertise the farm. How far it is either fair or expedient to accept sealed offers, is not so clear. On the contrary, it would appear to be more candid for the proprietor, to draw up the conditions on which the farm is to be let, and to give it to the individual the most likely to do it justice. Nor ought this plan of public adver-

tisement be adopted in the more improved districts, where agriculture is far advanced, and the farmers are an active, intelligent, and industrious class of men, possessed of sufficient capital, and of unexceptionable character. Where such a plan is followed, the natural ties which unite the proprietor and his tenant are burst asunder; and its tendency is, to excite the most malignant feelings in the heart of the tenant, to see a stranger and a rival promoted over him, and likely to reap the fruits of his long continued exertions and capital, sunk in the improvement of his farm.

By all these means, this mode of letting land, indirectly proves an obstacle to improvement. But, in certain situations, it does more; and fatal experience has shown, that it directly operates; for, in many instances, needy adventurers, who have nothing to lose, frequently offer the greatest rent; and the higher the state of improvement in which the farm is found to be, the more are such adventurers tempted to offer. Having nothing to lose, they are sure of reaping advantage for three or four years at the commencement of their lease; and by various artifices, they contrive too often to keep possession of their farm, till it is utterly ruined. After concealing for some time, the gains of their iniquitous conduct, they frequently abscond, and leave the landlord to reap the bitter fruits of his own folly and weakness.

To remedy this evil, is easy. Whenever a proprietor has a set of intelligent, industrious, active tenants, possessed of sufficient capital to cultivate their farms to advantage, he ought, in no shape, and on no account, to run the risk of parting with them. To prevent the possibility of this, instead of accepting sealed offers, he ought not even to listen to any one proposal, till the tenant in possession of the farm be heard. To him the first offer ought to be made; nay, made at least three or four years before the expiration of his lease. If, after twelve months' consideration, he is unwilling to accept, then, but not till then, ought any stranger to be permitted to bid.

SECT. VI.**ENTAILS.**

THE origin of entails, and the feelings that give rise to them, are not subjects which it is necessary here to discuss : The only one point that comes under consideration in this place is, how they affect the interests of agriculture, and the improvement of the kingdom. And it will not be a difficult task to prove, that they operate as one of the most powerful and extensive obstacles to improvement.

1. It is obvious that the possessor of an entailed estate, having only a liferent interest in it, has not the same encouragement to improve it, as one who is free from such fetters.

2. The same means are not in the power of the proprietor of an entailed estate, as of one that is unfettered. The expences and equipage suitable to his rank, are generally adequate to his rental ; especially if he lives in equal splendour, with a proprietor of the same rank, whose estate is free from entail. The latter can borrow money, or burden or sell a part of his land, to improve the rest, even though he lives up to his income. The former can raise money by none of these means. He is thus in the precise situation of a tenant with a liferent lease, without capital or credit to carry on extensive improvements *.

* It is true, that an act of Parliament was passed, in the 10th of his present Majesty's reign, entitling heirs of entail to improve their estates to a certain extent, under certain limitations, and authorising them to charge three-fourths of the expence from the next heir of entail. By this act, the effect of entails, as a bar to improvement, is partially, but by no means totally removed.

3. Besides, the great object of a landed proprietor, whose estate is free from entail, is to raise his rental. The higher it is raised, he reaps the more advantage, whether he sells, or keeps possession of it. Not so the other. Though his rents rise, neither he, nor the younger branches of his family, can long reap the benefit of it. He is thus placed in the situation of a tenant who is soon to leave his farm; whose object it is, not to improve it for his successor, but to reap as much present profit as possible. Hence, in place of raising his rent, a proprietor, in such a case, is tempted to take fines, or *grassums*, by means of which the farmer's capital is exhausted, and his exertions, during the currency of his lease, are paralyzed. To the immortal honour of a few proprietors of entailed estates, in spite of all their fetters, and surmounting every temptation to act otherwise, they have set a pattern of every species of improvement. But their example, few are either able, or inclined to follow.

It would tend to alleviate the mischiefs arising from entails, if the possessors of entailed estates had the power of granting leases for fifty years, with a progressive increase of rent, at the rate of 5 *per cent.* every ten years; and if greater latitude were given, than what is allowed by law at present, for carrying on substantial improvements,

SECT. VII.

WANT OF ROADS AND OTHER MEANS OF COMMUNICATION.

Roads are absolutely requisite to the improvement of any country. They are to the body-politic, what the blood-vessels are to the animal economy. By them the necessaries of life are freely circulated; the superfluities of one district, thus supply the wants of another, and every member of the community reaps the benefit of such communication. But, while roads, and of course a regular circulation of the necessaries of life, are wanting in any one district of a kingdom, not only is that district, but the whole community, exposed to feel the injury.

Roads are peculiarly requisite, for promoting every species of agricultural industry; indeed, without them, nothing of importance can be accomplished. Hence, of all other means of improvement, this is the first, and the most essential. Fortunately for Scotland, all its inhabitants feel and acknowledge this truth; and for half a century past, vast and extensive undertakings of this kind have been carried on in almost every county of the kingdom. Much, however, remains to be accomplished. Many districts still feel and lament the want of roads, and the means of regular communications. In all such cases, landlords and tenants ought to concur in forming and metalling such roads. Each ought to contribute his part. But if the farmer bears any great proportion of the expence, he ought to be indemnified, to a certain extent, by the landholder, at the termination of his lease, on condition that he has all along kept, and leaves the road in sufficient repair at his removal.

Where the produce of any farm can be conveyed only by land carriage, the expence of it frequently reduces the profit of the farmer to such a degree, as to put it out of his power to cultivate corn to a great extent; and where he has no market within a reasonable distance, it becomes the interest of the tenant, to rear cattle, and not to raise corn.

Where water-carriage can be commanded, by means of navigable canals, this obstacle is in a great measure removed. For by this means, corn can be carried to a great distance, at a small expence, and manure conveyed back to the farm by the same conveyance.

It is true, that farms situated on the sea-coast have similar advantages. But a voyage by sea is necessarily more hazardous and uncertain, than by inland navigation.

To remove the obstacle now mentioned, it would be requisite, in all such situations, to form new lines of road, and keep them in constant repair—or to form rail-ways, or canals of small dimensions, where it is practicable. This would remove the obstacle complained of, in inland counties. And by establishing grain markets in the principal towns along the sea-coast, the evil might also be in a great measure removed in the maritime counties.

SECT. VIII.

WANT OF DISSEMINATED KNOWLEDGE.

FORTUNATELY, this evil is not universally, nor even generally felt over Scotland. By the salutary laws of the kingdom, ample provision is made for the education of all ranks: And these means have been generally successful; for in no one region of the earth, can such an enlightened, and intelligent class of peasants be found, as in Scotland. Even in regard to agriculture, though this be only in its infancy as an art, the attainments have been great. In many counties in Scotland farmers may be found, who are not only conversant in every branch of practical farming, but in those sciences on which that art depends. They are not only capable of conducting all the operations of a farm, in the most correct style, but of understanding the scientific principles on which every operation depends. Hence, if there be any nation under heaven, where the want of disseminated knowledge is little felt as an obstacle to improvement, Scotland is that happy spot. Yet, even in Scotland, it is still felt in part; though it is to be hoped, that this will not be the case much longer. For a spirit of investigation and inquiry is already excited, and a ray of light already diffused, over the darkest corners of the kingdom, on every subject connected with agriculture, which will soon subdue long rooted habits, and dispel the clouds of ignorance, obstinacy, and prejudice.

Where knowledge is deficient, there are various modes by which it may be extended: 1. The sons of farmers may become apprentices to the most active, intelligent, and indus-

trious cultivators of the soil in the more improved districts * : 2. Farmers may improve their knowledge much by travelling, from time to time, through well cultivated districts, to mark the progress they have made, and the principles on which their improvements were carried on : 3. Agricultural societies may be established ; and, 4. Either agricultural libraries might be set on foot, or a few plain and practical treatises might be printed by such societies, and either circulated gratis or sold at a moderate expence.

SECT. IX.

DEFECTIVE AGRICULTURAL POLICE.

THE great variety of weights and measures in the several counties, has been complained of as an obstacle to improvement, and there can be no doubt, that an equalization of these, or a common weight and measure over all the king-

* In those districts where agriculture is in its infancy, and where ignorance and prejudice prevail, the plan of apprenticing the sons of farmers ought to be generally adopted ; for in one or two years, a youth of discernment and observation, may acquire, by this means, a more complete and accurate knowledge of the operations of a practical farmer, than by any precepts, however judicious. Landlords, therefore, instead of inviting tenants to come to their estates, from those districts which are in a high state of improvement, and bribing them, by favourable contracts, would find it equally advantageous, and more humane, to encourage the sons of their farmers to emigrate for a time, and thus to acquire that practical skill and proficiency which is all that they want. It would be a sufficient encouragement to them, to offer them a lease of their father's farm, after his death, or of another, on condition that they were thus qualified to conduct it with propriety. This mode of introducing new improvements, would be less expensive to the landlord, more advantageous to the public, and much more humane to the tenants, than turning them adrift to make way for a new colony. This plan was adopted, about fifty years ago, by that great friend to improvement, the Earl of Findlater, with the greatest success.

dom, would be an important advantage. Frauds are frequently committed, and disputes engendered, almost daily, from the want of this useful regulation, in almost every county in the kingdom ; and it appears an anomaly utterly unaccountable, that a people, speaking the same language, living in the same kingdom, and subject to the same government, should have such a variety in their standards both of weights and measures.

Economists, and those too the most enlightened, complain of the difficulty of remedying this evil ; and there can be no doubt, that it is both a delicate and a difficult task, otherwise the enlightened individuals and patriotic societies, who have so often attempted it, would not have been foiled in the attempt. Indeed, a uniformity of weights and measures has been frequently enacted by law, but hitherto in vain. By an act of the Scotch Parliament in particular, *anno* 1618, the length of a yard was fixed at 37 inches—the stone weight was declared to be 16 lb. Troy, each containing 16 oz.—the pint and firiot were all fixed. If such an act could be safely revived, or one more explicit, made applicable to the times, were enacted, much fraud, injustice, confusion, and strife, would be prevented, and the improvement of the country would be advanced.

Such are the chief obstacles to the improvement of Scotland. Such also are the means that have been recommended for their removal. Some may be obviated by landlords others by tenants ; some require the united efforts of both ; and others cannot be surmounted, without the powerful aid and interference of the legislature.

To those whose views are limited to one county, or to one corner of the kingdom, some of these obstacles will appear to be imaginary. But let any intelligent individual peruse the County Reports published by the Board of Agriculture, and

he will be compelled to acknowledge, that, though these obstacles seldom extend over the whole kingdom, and though ~~they do not~~ all exist in one county, yet that ~~they do exist~~, and operate separately, though, in some counties, more powerfully than in others.

It may be said, that the improvement of Scotland has already advanced with a rapid pace ; and that this is a palpable proof that no such obstacles exist. In reply to this, it ~~may be observed~~, that these improvements have been most rapid, where fewest obstacles were felt ; and though, in some districts, the greatest obstacles ~~have been~~ surmounted, yet, improvements would have been still more rapid, if such obstacles had been removed. A giant may travel with a load on his back, which would crush a pigmy to death. But ~~that~~ giant would travel with more ease and rapidity, if he had not had such a load to carry. So, the gigantic efforts to improve the soil of Scotland, would still have been greater, and more successful, if no such obstacles, as those which have been above enumerated, had existed.

PART II.

OF THE ENEMIES INJURIOUS TO THE FARMER IN HIS PROFESSIONAL PURSUITS.

THIS is a subject of considerable importance and extent, from the number of enemies to whose depredations the farmer is exposed. They may be classed under the following heads: 1. Insects; 2. Birds; and, 3. Terrestrial animals. Some *general observations* regarding the nature of their attacks, and the modes of preventing them, shall be shortly stated.

I. INSECTS.

There are two reasons why the farmers in Scotland, suffer less from the depredations of insects, than in more southern countries; 1. The climate, which is wet and cold, and subject to severe frosts*; 2. The systems of husbandry, which are highly unfavourable to the reproduction of the insect tribe. The moderate extent of land kept in permanent pasture, is hostile to their increase in grass lands; whilst on strong soils, a well-wrought summer fallow, begun in winter, and carried on throughout the spring and summer, and part of autumn, not only destroy these vermin themselves, but expose their eggs or larvae to the attacks of birds†. Green crops also, when properly cultivated, produce nearly the same effects.

* Banffshire Report, p. 319. The irregularity of our weather is in this respect an advantage. In northern countries, as in Sweden, where the seasons are regular, the insect tribe do much mischief.

† Dumfriesshire Report, p. 190.

The insects most injurious to the farmer are, 1. Those which attack the young leaves and the roots of grain, as, Snails, the wire-worm, and slugs or grubs; 2. Those which attack the ear; and, 3. The turnip-fly or beetle.

1. Insects that attack the young leaves and the roots of grain.

Snails. — There are two modes adopted by farmers in Scotland, for preventing injury from snails, and other vermin abounding on the surface, which cannot be too strongly recommended to the attention of our southern brethren; one by Mr Hunter of Tynefield in East-Lothian, the other by Mr Church of Hitchill in Dumfries-shire.

Mr Hunter's plan is a very ingenious one. He does not sow his wheat after clover, till about the middle of January, and if the season will not then allow, as soon after as possible. But he ploughs his clover stubble early in December, that the snails bred among the clover, and other vermin in the ground, may be turned up and destroyed by the frost and the season. Formerly, he used to plough and sow in November; but these vermin, not being then in a torpid state, crept into the ground again, and coming out in spring, thinned the wheat materially. Ploughing in December, and sowing in January or February, answers the purpose of destroying them effectually*.

Where sowing wheat in January is objected to, Mr Church's plan may be adopted. He recommends breaking up the grass immediately after the crop of hay is taken off in July, sowing it with rape or cole, after one furrow, and eating it down with sheep in September or October. As soon as this is done, the land should receive only one furrow, and should then be sown with wheat. This method reduces the land to a fine state, and at less expence than by a bastard fallow; and though the summer pasture is partly lost, yet the

* Husbandry of Scotland, vol. ii, Appendix, p. 52.

feed in September and October amply compensates for it. The ground is more sensibly enriched than by the summer pasturing, and rendered so fine, that the wheat crop could easily be drilled. By this method, the soil is not only put into a rich and mellow state, but that something is removed, which makes wheat after grass otherwise unsuccessful *. The treading of the sheep, likewise, consolidates the soil, and probably destroys the vermin which nestle in it, and their eggs or larvae.

The advantages that would result from the adoption of these practices, in the southern parts of the kingdom, where such an extent of wheat, sown on clover ley, is annually destroyed by vermin, baffle all calculation.

The wire-worm.—For the reasons already mentioned, the red or wire-worm, is but little known in the generality of the Scotch counties †. This is a fortunate circumstance, as their depredations are so extensive and injurious where they abound. These vermin remain in a grub state from one to perhaps five years: from four to eight worms have been found in a square ell, or four square feet, and it is ascertained, that a single worm has bitten from four to twenty stalks in one place ‡. Their attacks are less felt, where it is the practice, instead of wheat, to cultivate oats on clover and other leys, being a much hardier grain.

Some farmers are of opinion, that the application of hot lime will destroy these and other vermin, who nestle in the surface of ley, or of old matted turf; but paring and burning is found to be a more effectual remedy, and when both processes are united, success is certain. By some, culinary salt

* Husbandry of Scotland, vol. i, p. 327.

† Berwickshire Report, p. 497. Ayrshire ditto, p. 671. Stirlingshire ditto, p. 376.

‡ See Communications to the Board of Agriculture, vol. iv, p. 412. By Thomas Marsham, Esq. He recommends employing children to follow the plough to pick up these vermin, and to put them in a glass bottle, box or leather-bag, that they may be destroyed.

has been recommended, but the expence, whilst the present duties remain, would be too high.

Slugs and grubs.—The grey slug and the grub, are numerous in the northern districts, and destructive to potatoes, turnips, oats, and to the bear or barley crops, as soon as they appear above ground. There are many instances of fields of several acres sown with potatoe oats, being stripped quite bare by the grub, during the cold north-west winds in the month of May; and their depredations continue until warm weather, and occasional showers, put a stop to their progress. The grey slug, in wet weather during harvest, even creeps up the ears of the corn, and feeds upon the grain *.

It is well known, that the grub, and the grey slug, keep under the surface of the soil in the day time, and that after midnight, they crawl on the surface, and prey on the young plants. Where a number of ducks can be had, they will destroy great numbers of grubs, but that can only be but a partial remedy. Some experiments have been made to prevent this mischief, by strewing the rough awns of bear or barley on the surface of the land, after it is sown and harrowed. And as far as these awns were used, these vermin do no damage to the crop; whereas, in any part of the same field, where no awns were sown, the crop has been greatly injured. This clearly shews, that by this simple process, the movement or progress, and the consequent depredation of that destructive vermin, may be prevented.

Rolling the land with a heavy roller in the night time, has, in many cases, destroyed these vermin. Among other experiments which prove the efficacy of this practice, the following may be relied on.

In the course of summer 1808, a respectable farmer found, that the grub did much damage in a field of clover ley sown with potatoe oats, and for three or four days the mischief was rapidly spreading. He resolved, therefore, to apply a heavy cast-iron roller, weighing about 13 cwt., early in the morn-

* Caithness Report, p. 262.

ing, and after a night intertrenching, to roll with it a second time. It perfectly stopped the progress of the grub, and even the part attacked produced a heavy crop, but not so forward as the rest. The first morning the whole surface was covered with grubs, but on the second application very few were observed *.

Wooden-rollers are of little or no advantage for this purpose, unless loaded with stones in a box made for holding them. The weight of the stone-roller is too great for its diameter; and when applied to rough land, it is too heavy to work, unless great force be applied; so that metal rollers are the best. The chief bar to their general use is the price, (£L.20), which ordinary farmers cannot afford, unless several were to join together, to purchase one for their common benefit: care must also be taken to prevent their breakage.

The use of lime to destroy grubs has been recommended; but the coats of insects, when in the grub state, are hard, dry, and as tough as leather, and calcareous matter is only destructive to insects, in its hot or caustic state; a quality of which it is soon deprived by exposure to the atmosphere.

It has been ascertained by experiment, how far lime will operate in the destruction of grubs. A gardener, whose crops of peas were injured by them, brought some lime from the kiln, and getting up before day-break, had a quantity immediately slackened, and carried in a wheel-barrow to the place where he had sown his early peas. As soon as the day dawned, to allow him to see how matters stood, he put some of the hot lime into a sieve, and going to the windward side of the peas, he gently shook the sieve. The hot caustic powder instantly pervaded the surface of the ground to leeward. In this manner he went along the whole windward side of the plot. He observed, that a single particle of lime did not kill a slug, for the insect had the faculty of throwing off a slimy slough, and disengaging itself from the particle, but if, in the progress to its

* Caithness Report, p. 263-5.

hole, which it immediately made for, it came in contact with a second atom, however small, which it was almost certain to do, it had not the power of extricating itself as in the former instance, but, wreathing about in the greatest agony, it soon expired *.

2. *Insects injurious to the ears of grain.*

This important subject has been of late materially illustrated, by some intelligent and public-spirited members of the Linnean Society of London.

In the transactions of that useful institution, several papers are printed on the subject, from which it would appear, that the crops of wheat are injured by various maggots or insects, but that the principal are, the wheat-insect, or ear-worm as Dr Coventry calls it, (*Tipula tritici*), and the *Thrips physapus*. The former produce small yellow larvæ or maggots, which become short, thick, black flies. These larvæ, it is conjectured, may feed on the farina or male dust of the stamina, and may possibly prevent the proper fertilization of the pistil, in such a manner, as to occasion the future grain to be shrivelled and imperfect. Others maintain, that the fly, in general, does not make its appearance until the spring, so as to be in readiness to deposit its eggs in the wheat, when it has made so much progress in growth, that the larvæ may be hatched about the time of its going into blossom. Mr Kirby observed, on the 3d of June 1778, an innumerable host of the *tipula*, flying about in all directions in the wheat fields. They are seldom to be seen before seven o'clock in the evening; at eight o'clock the field appeared to swarm with them, at which hour they are busily employed in laying their eggs in the florets of the wheat: about nine o'clock they generally disappeared. About the twenty-ninth of June, the parent *tipula* were no more to be seen. Some naturalists are of opinion, that the *tipula tritici* or wheat insect, and the *tipula*

* Husbandry of Scotland, 2d edit. vol. ii, App: p. 57.

pini or fir-insect, are the same : and it is a singular circumstance, that in a field where the upper part was near a plantation of firs, the wheat was much affected, but considerably less so, at a distance from the plantation.

The *Thrips physapus* also, does considerable mischief to wheat. It takes its station in the longitudinal furrow of the seed or grain, in the bottom of which it seems to fix its rostrum ; it probably sucks the milky juice which swells the grain, and thus, by depriving it of *part*, and in some cases perhaps of the *whole* of its moisture, occasions it to shrink up, and to become, what the farmers in some parts of England called *pungled*. It is a mistake to suppose, that only a single pickle in an ear is injured by it. In many years, a fourth part of the grain is either destroyed or materially hurt, and Mr Kirby reports it, as the conviction of a very intelligent farmer, that this insect occasioned what was called a *blight*, in a year when the crop was peculiarly defective.

The destruction effected by these insects, would be immense and incalculable, were it not that they are fortunately liable to the attacks of a number of enemies, who either devour them, (as small birds do), or who destroy their larvæ. The destroyers of the larvæ are different species of the ichneumon. Mr Kirby, in the course of his interesting inquiries, discovered three different species of ichneumon, each of which, by separate means, attacked the *Tipula tritici* ; and thus set bounds to the ravages of an insect, which, however insignificant it may seem at first sight, might, if permitted to exceed its due limits, deprive us of the staff of life, and might almost occasion the destruction of our species *.

3. *The Turnip-Fly or Beetle.*

The depredations of this insect have been already dwelt upon in a former part of this work, (vol. i, p. 558-9), and

* Husbandry of Scotland, 2d edition, vol. ii, Appendix, p. 195.4-5.

it only remains therefore to state two other modes by which their ravages have been prevented.

An intelligent farmer near Edinburgh, (Mr Johnstone of Hill-house), always thins or pricks out his turnips, as soon as they appear above ground; they are certain then of being in the rough leaf next morning, when they are out of danger*.

An improvement in the cultivation of turnips, in very dry soils, without any mixture of clay in them, by which the ravages of the fly or beetle may in some degree be prevented, has, for several years past, been recommended by Dr Coventry in his lectures on agriculture; that of using a *heavy roller* for the turnip drills, instead of the light ones usually employed. The utility of the same practice was likewise accidentally discovered by Mr Darling, a native of Berwickshire; by the adoption of which he found, that young turnips soon appeared even in a very dry season, when the crops in the neighbourhood, where light rollers were used, completely failed. The reasons are obvious. The soil being thus compressed, moisture is retained in it; nor can the gaseous effluvia, arising from the decomposing putrescent mass below, by which the young plants are nourished, so rapidly escape.

2. BIRDS.

The birds to whose depredations the farmers in Scotland are exposed, are as follow: 1. Sparrows. 2. Pigeons. 3. Rooks. 4. Ravens. And, 5. Eagles.

1. *Sparrows*.—This species of the feathered tribe is, upon the whole, more prejudicial to ripening crops, of all kinds, than any other bird whatever, particularly in small inclosures, surrounded with hedges of thorn or beech ‡. They are likewise extremely destructive to the roofs of thatched houses, so abundant in agricultural districts †. There are strong grounds, however, to conclude, that they are of

* Forfarshire Report, p. 363.

† Banff Report, p. 320.

‡ Ayrshire Report, p. 672.

as much benefit to farmers in other respects, as they are injurious in regard to these particulars. During a great part of the year, they derive their food from the seeds of weeds, from worms, grubs, and other vermin, which might accumulate without their aid, so as to produce much more injury * ; and indeed, if they were suffered to multiply without such a check, would overrun and lay waste the vegetable kingdom †.

Sparrows may be destroyed by barley steeped in a solution of arsenic, and the grain then strewed near walls or hedges in the month of June‡; or they may be taken, in an intoxicated state, by grain steeped in any kind of spirits, or narcotic liquid.

2. *Pigeons*.—These birds are not so numerous as formerly, partly owing to the destruction of weeds, from the seed of which they derived a portion of their support, and partly to the prevalence of winter ploughing, which buries the grain left on the ground in harvest, from which they obtained a considerable portion of their food in the severest period of the year §.

Farmers complain much of the devastations committed on the growing corn by pigeons, not only owing to what they eat, but what they beat down and destroy. It has been calculated, that they consume little short of their own weight of corn in a day ¶; that grain, equal to the maintenance of 3030 persons, is consumed by pigeons in the county of Mid-Lothian alone; and that in the whole Island of Great Britain, the total quantity of grain consumed by them would feed 120,000 of the human species ¶.

* Berwickshire Report, p. 473.

† Stirlingshire Report, p. 377.

‡ Caithness Report, p. 255.

§ East-Lothian Report, p. 202.

¶ Forfarshire Report, p. 452.

¶ Perthshire Report, p. 382. This calculation, however, must be greatly exaggerated. In many districts, hardly any pigeon-houses are to be met with. Pigeons live much on the seeds of weeds, and grain that has been shaken, where, from defective husbandry, it has not been ploughed down; and it is only during a short period of harvest, that their depredations are of any material consequence.

3. *Rooks*.—Several years ago, a society was formed, in the lower part of Berwickshire, for the destruction of rooks, in consequence of the havoc they make among corn and potatoe fields, during seed-time and harvest, and in turnip and clover fields during winter *. At the same time, by the great number of worms and grubs they pick up through the spring in following the plough, and the myriads of pernicious insects which they destroy, at all seasons †, it is generally believed, that they are rather beneficial than hurtful to agriculture ‡; and perhaps this, though not so easily discovered, may be said of most other species of birds ||.

4. *Ravens*.—These birds are destructive to the sheep farmers. They attack sheep when entangled in briars, and lambs when found straggling from their dams, on account of weakness, or the severity of the weather. The raven, or *corbie* as he is provincially called, first picks out the eyes of his prey, and afterwards feeds upon the carcase §.

5. *Eagles*.—In several northern districts, eagles prove formidable enemies to the helpless sheep, for many miles round their haunts. They hatch in the most inaccessible rocks, and occasionally carry off, in their powerful talons, a lamb to feed themselves and their young ¶. But by the vigilance of the shepherds, they are much reduced in their numbers **.

* Berwickshire Report, p. 499.

† Kincardineshire Report, p. 396.

‡ Mr Ballingal of Sweet Bank in Fife, in 1813 had a field of twenty acres of oats, from old grass ploughed up, which was likely to be entirely ruined by slugs and the wire worm. Liming and rolling with a cast-metal roller destroyed the former; but the crop would have been entirely lost by the depredations of the latter, had it not been, that a number of rooks, (who are particularly fond of the wire-worm), came from a rookery at two miles distance, and care being taken not to disturb them, they soon cleared the field of this destructive vermin, and were the means of securing an abundant crop, which otherwise would probably have been lost.

|| Banffshire Report, p. 320.

§ Perthshire Report, p. 410.

¶ Ayrshire Report, 673.

** Perthshire Report, p. 410.

9. TERRESTRIAL ANIMALS.

The terrestrial animals destructive to the farmer are, 1. Rats and mice; 2. Moles; 3. Foxes, martins, polecats, &c.; and 4. Dogs.

1. *Rats and mice*.—A considerable proportion of the depredations committed by these vermin, may be effectually prevented, by placing corn-stacks upon frames of wood, supported by pillars of stone, or still better of cast-iron, with a coping to prevent the vermin from ascending*.

A mixture of finely pounded quick-lime, with from a quarter, to half the quantity of oat-meal, and a little sugar, has lately been found a most effectual poison for rats or mice†.

To destroy rats or mice, slice cork into small pieces, then fry them with butter or other grease, and lay them in places frequented by these vermin. They will eat the cork thus prepared, and upon their drinking water, the cork will swell and kill them‡.

As poisoning these vermin, however, is sometimes attended with unpleasant consequences, it has been found, on the whole, most advisable, to catch them in traps in houses, or pitfalls in the fields, and then to destroy them. Both rats and mice are most powerfully attracted by the oil of caraway, which is not an expensive article, more especially as, when used with ground malt, the best substance to employ, the proportion of the oil to the malt, should only be at the rate of 1 in 9000 §.

2. *Moles*.—These animals become extremely numerous, where the land has been enriched by cultivation and manure,

* Stirlingshire Report, p. 377. See also vol. i. p. 396.

† Berwickshire Report, p. 498.

‡ Caithness Report, p. 265. The plan recently published by Mr Broad of Herefordshire, promises to be useful, but properly belongs to the General Report of England.

§ The advantage of employing the oil of caraway, in preference to other articles, was first discovered by Mr Broad, a farmer at Thruston in Herefordshire.

and where animalculæ abound in the soil *. They are probably, however, more unseemly than injurious, though, when they multiply exceedingly, their numbers ought to be thinned. Their unsightly hills on pastures, or grounds intended for hay, are easily spread over the surface in spring, at a very small expence, and become a species of top-dressing †.

It is contended that both moles, and the worms on which they feed, serve many important purposes in the economy of nature. They perforate the soil in a thousand directions, which would otherwise be locked up in an impervious paste, or drowned in a mirey swamp; and by their means, the vegetable mould is kept open, and innumerable drains are furnished, to lead off, by their declivities, the water which would otherwise accumulate near the surface. The soil is likewise thus preserved in a state, admirably calculated for the expansion of the roots of plants ‡.

In Moray, attempts have been made to destroy a whole colony of these animals, by smoke arising from an English pint or two of tar, mixed with an ounce or two of flour of sulphur, and made to burn in a piece of any broken iron or earthen pot, in the central pit of any colony of these vermin. The pit is loosely covered with a board, or old empty beehive, so as to admit as much air as will support the fire. If continued for half an hour, the destruction of that colony will be accomplished §.

3. *Foxes, martins, polecats, &c.*—In various parts of Scotland, owing to the great and increasing extent of the woods and plantations, foxes, martins, polecats, and wild cats abound, and commit many depredations on the flocks and poultry of the farmer. In several districts, fox-hunters, furnished with a proper pack of hounds, are regularly employed, and paid by the

* Ayrshire Report, p. 673. † Berwickshire Report, p. 499.

‡ Stirlingshire Report, p. 378.

§ Agricultural Report of Nairn and Moray, p. 440.

grazing tenants, according to the extent of their possessions*. This is more particularly necessary, since the introduction of sheep-stocks into the Highlands, great havoc being done by those vermin, among the lambs when they are dropt, among feeble sheep in spring, and among those that are entangled by briars. By increasing the premiums for destroying them, they might, in process of time, be extirpated, as wolves formerly were †.

Fox-hunters have at present regular districts of country committed to their care, from which they levy annual assessments on the several farms according to their contract. This plan is capable of being much improved; and it were a wise and effectual measure, to make the assessment moderate, and besides the assessment, that each farmer were to pay a small sum as a reward for every fox these fox-hunters killed, and to subject them to a small fine, for every sheep or lamb which it could be proven had been killed by a fox within their district. If this regulation were adopted, (which is very much in the power of their employers), it would be a spur to their diligence, beyond any thing that has hitherto been devised ‡.

In the maritime parts of Scotland, foxes are not considered to be so injurious to the farmer, as they occasionally subsist on the produce of the sea, haunting much the rocks and caves by the shore, and being frequently seen prowling within sea-mark ||.

4. *Dogs*.—A number of absolutely useless dogs, kept by cottagers and farmers' servants, do infinitely more injury among young lambs, than the foxes. Instead of exempting these noxious curs, every dog kept by a cottager ought to be taxed, unless the owner produces a certificate from the farmer he serves, that the dog is necessary upon the farm. A moderate tax upon them, to be allotted towards the repairs of

* Stirlingshire Report, p. 378.

† Inverness-shire Report, p. 382.

‡ Perthshire Report, p. 411.

|| Kincardineshire Report, p. 394.

highways, and other such objects of county police, would raise a considerable sum, and compensate, in some measure, for that annoyance they are continually giving to travellers. A tax of a shilling a-head would be paid without reluctance. The present tax of 7 s. is not only too high, but it defeats its own object. Nobody will own a cur that is to cost 7 s. yearly of tax. It is much more, in fact, than the value of the animal, and rather than pay at such a rate, the owners would give the dog to the surveyor in a present ‡.

Some zealous friends to agriculture, are inclined to include game, as hares, partridges, &c. among the enemies to the farmer; and it must be admitted, that in some particular instances, considerable damage is done by them. At the same time, every thing that tends to make a residence in the country more agreeable to the higher orders of society, is so essential for the public interest, and, in particular, so favourable to improvement, that it would not be advisable on that account, to destroy the game, for the purpose of preventing any damage which they may occasion, more especially as they are not maintained at the expence of the farmer, since the land is let at a lower rent, in proportion to the injury likely to be sustained by their depredations.

• Kincardineshire Report, p. 397.

CHAP. XVIII.

ON THE AGRICULTURAL SOCIETIES OF SCOTLAND.

BY THE REV. ROBERT RENNIE, D. D.

MINISTER OF KILSYTH.

It is proposed, in this Chapter, to give some account of,
1. The origin and progress of the agricultural societies first
established in Scotland; 2. The number that now exist in
that part of the united kingdom; 3. The objects for which
they have been formed; 4. The rules they have adopted;
5. The advantages that result from them; and, 6. To sug-
gest a few hints for their farther improvement.

SECT. I.

ORIGIN AND PROGRESS OF THE AGRICULTURAL SOCIETIES FIRST ESTABLISHED IN SCOTLAND.

WHILE the attention of the Scotch nation was occupied with the feuds of the clans, and wars with England, it is not surprising that cultivation was neglected, and that no agricultural societies were formed. Nor was it till the union of the two kingdoms in 1707, when the produce of the soil was no longer exposed to domestic incursions, or foreign invasion, that agriculture came to be generally regarded as the great source of national prosperity.

It was on the 8th of June 1728, that the first association in Scotland, and indeed, the earliest in Europe *, was formed, for promoting the interests of agriculture. A number of individuals, distinguished for rank, character and talents, united in a society for that express purpose. The title they assumed was, *The Society of Improvers in the knowledge of Agriculture in Scotland*. Their number was respectable, about 300, of whom 40 were peers. Their transactions were published occasionally, from 1728 to 1743, when a volume of nearly 500 pages, containing the select transactions, prepared by Mr Maxwell of Arkland, was revised and approved of by their President, Mr Hope of Rankeilior, and a committee of the society. It appears from that publication, that turnips, and sown grasses, not excepting lucern and sainfoin, were cultivated above seventy years ago, by the Earl of Stair at Newliston, and by other Scotch agriculturists who imitated his example. It is evident, indeed, from these transactions, that the society flourished for upwards of twenty years; that their efforts to promote the improvement of Scotland, were great and liberal; that they were crowned with success beyond their most sanguine expectations; that a number of interesting memorials from all parts of the kingdom, on the most important branches of agrestic economy, were communicated to them; that a proposal was made, and a plan adopted, for having a regular course of agricultural lectures delivered annually in Edinburgh; and that Mr Maxwell of Arkland did actually deliver such a course, for one, if not two sessions.

But the death of Mr Hope, their President, who was the

* It appears that the Dublin Society, which some have supposed was the first in Europe, was established in 1731, in imitation of this institution. In Mr Maxwell of Arkland's work, (Dedication, p. 9), there is the following paragraph: "The sea itself has not been able to confine the influence of your example; for the Irish have entered into a society in imitation of yours, and it appears even by what they have published, that they are exceedingly useful, and of singular service to their country."

life and soul of the society, and of some others of its most distinguished members, was a fatal blow to this infant institution; more especially, as it had not received, as it ought to have done, that public support, by means of which, its offspring, the Dublin Society, has continued to flourish. It was thus nipt in the bud; and the interests of agriculture, and the improvement of Scotland, were unfortunately retarded.

The next Scotch Agricultural Society, in point of seniority, was that of Buchan in Aberdeenshire. This society was instituted in the year 1730, only seven years after the former, from which it probably took its rise. Like it too, it was wholly composed of proprietors, the majority of whom belonged to the counties of Aberdeen and Banff. Some distinguished noblemen, and lords of session from the southern counties, however, were also constituent members. They assumed the modest title of, *A small Society of Farmers in Buchan*.

In the year 1735, the Buchan Society published the result of their researches, under the title of "*An Exact Relation of the Practice of Farmers in Buchan, with Rules of Management*." These rules are a great curiosity in the annals of Scotch agriculture. They exhibit a striking picture of the state of farming at that period, when summer-fallow was scarcely known, and when the culture of potatoes and turnips, green crops and grass-seeds, had not yet commenced in those northern districts.

However rude these rules may now appear, it ought to be remembered, that they were not the dictates of illiterate peasants, but of persons of the highest rank and talents in Scotland at the time, and who had turned these talents so much to agricultural researches, that they even pointed out the philosophical principles on which they proceeded in their practice. These rules were only recently discovered in the repositories of a gentleman, who had lately died at the advanced age of 92. They had been long forgotten by every farmer and proprietor in Buchan; but they must have

been highly valued at the time they were published, for no less a number than sixteen gentlemen of the highest rank, subscribed each for *ten copies* of the work *.

A few years posterior to this in point of time, but far superior in regard to knowledge, the Agricultural Society of Ormiston in East-Lothian was formed. It was distinguished by the attendance of Lord Drummorie, Mr Cockburn of Ormiston, and other improvers in the three Lothian counties.

From this period, the spirit which had been thus roused, seems to have slumbered for nearly half a century. Indeed, from the corrected county reports, it appears, that till the year 1784, only two attempts were made to form such associations: One, called the Dumfries and Galloway Society, constituted about the year 1772, and another about the same time at Kilbarchan in the county of Renfrew; but both these societies were dissolved in the course of a few years.

A more extensive and important institution was formed in the year 1784, under the name of "The Highland Society of Scotland." In 1787 it was constituted a corporation by a royal charter, and received a grant of L. 3000 from the money paid when the forfeited estates in Scotland were restored. The number and respectability of its members have since yearly increased. Their patriotic exertions have kept pace with their prosperity; and now they form one of the most numerous and respectable agricultural institutions any where to be met with.

It was not, however, till the establishment of a National Board of Agriculture in August 1793, that a spirit of agricultural improvement became generally prevalent. From that period, the smaller agricultural societies, in general, date their

* To transcribe these rules into this Chapter, would swell it to double its size. They are published in the Appendix (NO. vi) to the Agricultural Report of Banffshire; and the ingenious author of that valuable report, deserves well of his country, for having recorded this paper in such a manner, that it may be resorted to, in future ages, as a curiosity in the records of Scottish agriculture.

origin; and more was effected, in the short period of twenty years, to rouse the spirit of the nation, for promoting the agricultural prosperity of the country, than in the many ages which have elapsed since the Scottish Monarchy was founded.

SECT. II.

A LIST OF SCOTCH AGRICULTURAL SOCIETIES WHICH EXIST AT THIS TIME.

WHEN the spirit of improvement was feeble, few individuals would give themselves the trouble of meeting to discuss questions connected with agriculture; but when that spirit became powerful and energetic, associations for promoting the advancement of husbandry, were rapidly established. Hence, instead of one or two societies, as formerly was the case, they are now established, (as appears from the following list), in every quarter of Scotland.

Name of the Society.	County where it meets.
Aberdeen,	Aberdeenshire.
Alford,	Ditto.
Annan,	Dumfries-shire.
Annandale, (Upper district of)	Ditto.
5. Ardrossan,	Ayrshire.
Banff,	Banffshire.
Blairgowrie,	Perthshire.
Border,	Roxburghshire.
Brechin,	Forfarshire.
10. Buchan,	Aberdeenshire.
Caithness,	Caithness.
Callander,	Perthshire.
Castle-Douglas,	Galloway.

	Name of the Society.	County where it meets.
	Clackmannan,	Clackmannanshire.
15.	Dalkeith,	Mid-Lothian.
	Dumfries,	Dumfries-shire.
	Dundee,	Forfarshire.
	Doune,	Perthshire.
	Edinburgh,	Mid-Lothian.
20.	Elgin,	Moray.
	Erskine and Inchinnan,	Renfrewshire.
	Fife,	Fife.
	Forfar,	Forfarshire.
	Forres,	Moray.
25.	Galston,	Ayrshire.
	Gargunnoch,	Stirlingshire.
	Garioch,	Aberdeenshire.
	Glasgow,	Lanark.
	Greenock and Inverkip,	Renfrewshire.
30.	Highland,	Mid-Lothian.
	Inverkeithing,	Fife.
	Inverness,	Inverness-shire.
	Isla in the Hebrides,	Argyle.
	Kilsyth,	Stirlingshire.
35.	Kilmarnock,	Ayrshire.
	Kincardine O'Neil,	Aberdeenshire.
	Kintyre,	Argyle.
	Kirkcudbright,	Galloway.
	Kirkwall,	Orkney.
40.	Langholm,	Dumfries-shire.
	Linlithgow,	Linlithgowshire.
	Lunan and Vinney Water,	Forfarshire.
	Maybole,	Ayrshire.
	Mearns,	Kincardineshire.
45.	Nairn,	Nairnshire.
	Newmills,	Ayrshire.
	Rhins of Galloway,	Galloway.
	Tweeddale Farming Society,	Peebles-shire.
	Tweeddale Society for prosecuting Thieves,	Peebles-shire.
50.	Ross-shire,	Ross-shire.
	Salton,	East-Lothian.

Name of the Society.	County where it meets.
Stonehaven,	Kincardineshire.
Strathearn,	Perthshire.
Stronsay,	Orkney.
Tweedside,	Berwickshire.
West-Lothian,	Linlithgowshire.
57. Wigton,	Galloway *.

Thus it appears, that there are, in Scotland, above fifty societies connected with agricultural objects; and that there is scarcely a county in the kingdom, where such useful institutions have not been established. Wherever they have existed, they have almost universally excited a spirit of improvement; a circumstance uniformly dwelt upon in the county reports. Indeed, in these publications, the only subject of regret is, that in some districts, such societies have not been formed by the exertions of the proprietors. Without their countenance and aid, such institutions can neither be kept up, nor prove extensively useful. Hence it has sometimes happened, that the death of one distinguished member has dissolved the society altogether. The death of Mr Hope of Rankeillor, dissolved the first agricultural society that was ever formed in Scotland; and owing to the infirmities of Mr Craik of Arbigland, the Dumfries and Galloway society was given up. This proves how incumbent it is on all proprietors of real public spirit, to countenance such institutions, that they may be prevented from falling into decay.

* There are some additional clubs or societies, in some of the counties, the names of which could not be obtained.

SECT. III.

THE OBJECTS FOR WHICH AGRICULTURAL SOCIETIES HAVE BEEN FORMED.

THESE vary according to the views of the founders, and the situation and circumstances of the members. Sometimes they are limited to one; in other cases, they include a great variety of particulars. Instead of pointing out, however, the precise object of each society, it may be proper to *classify* all the objects which have attracted the attention of agricultural societies *in general*, and point out the means they have pursued for promoting these ends.

1. *The diffusion of useful knowledge.*

A variety of measures have been adopted for carrying this object into effect, of which the following are the most essential: 1. By means of personal and friendly intercourse between the several members of the society. 2. By keeping up a regular correspondence with other societies of a similar description. 3. By discussing freely at their meetings the several subjects connected with their profession. 4. By forming libraries, containing the best books on all the branches of agriculture, and circulating them among the members. 5. By appointing some of their members to survey annually all the operations carried on in the district where the society is established, and to report the particulars to be annually recorded. 6. By appointing others to travel into districts, where agriculture is better understood and practised, and also to report to the society the result of their observations to be likewise recorded. 7. By the circulation of

cheap publications: And, *lastly*, By furnishing essays, memoirs, or communications upon interesting subjects, and reading and depositing these with the society, or printing them for its use.

2. To encourage every improvement in the practical operations of agriculture.

A variety of means has been devised and adopted for promoting this important end: These may all be included under the following particulars. 1. Promoting the most perfect culture and rotations in arable soils. 2. Appointing ploughing matches in the several districts of the society*. 3. Introducing and encouraging the culture of green crops, where these are but partially known. 4. Promoting draining of every description. 5. Explaining the proper preparation and application of manures. 6. Improving the quality of grain or grass, and introducing new species of both. 7. Encouraging the improvement of barren land, and mosses of every description. 8. Promoting the destruction of weeds of all sorts, not only in the cultivated land, but also along sides of roads and fences. 9. Recommending the destruction of all kinds of vermin, which prey on the seed or grain in spring or harvest; And, *lastly*, Animating the members, by the distribution of premiums, or honorary marks of distinction, to excel in these important particulars.

3. To promote the improvement of Live Stock.

This important end is promoted by conferring premiums on those who excel in the following branches: 1. Introdu-

* The utility of ploughing matches is thus described in the Stirlingshire Report, p. 384. In the districts of that county, where ploughing matches are unknown, the operation is generally performed in a slovenly manner, and the ridges are broad and crooked; whereas, within the bounds of the Gargunnoch club, by whom ploughing matches are encouraged, the form of the ridges, and the manner in which the furrow is turned, furnish a model.

cing any new breed of horses, cattle, sheep, or hogs, adapted to the soil and climate, and likely to be more profitable than the old stock. 2. Devising the most economical methods of rearing, feeding, or fattening live-stock. 3. Introducing milch cows better adapted for the soil and climate, or improving the old breed. 4. Pointing out the most correct and profitable management of the dairy : And, *lastly*, Promoting, by premiums, the rearing of the best stallions, bulls, rams, and boars, for the improvement of the breeds in the county.

4. To establish an improved system of police, in the district where the society is constituted.

This is an important object of such societies ; and under that impression, several associations have been formed, 1. For prosecuting thieves, robbers, and other delinquents, at the common expence. 2. For protecting the property of the members from depredations of all kinds, and prosecuting such as are detected in committing them. 3. For protecting all fences, and punishing such as injure them. 4. For punishing acts of dishonesty, abuse, or idleness, committed by the servants of the several members. 5. For rewarding their skill, diligence, and fidelity. 6. For fixing on markets at the most convenient seasons for hiring servants, or other purposes. 7. For preventing any member from hiring the servant of another, without a certificate of his character from the master he serves. 8. For the establishment of new markets for grain and live-stock, or encouraging those already established : And, 9. For rendering the cottage system as perfect as possible.

5. To promote the improvement of the arts connected with agriculture, or subsidiary to it.

This is a radical object of agricultural societies, and is found to be attainable by the following means : 1. By encouraging skilful mechanics, or labourers, as smiths, carpenters, ditch-

ers, drainers, &c. to settle in the district where the society is established. 2. By rewarding every new and useful invention in any one of these arts. 3. By encouraging every improvement made in implements of husbandry. 4. By rewarding the discovery of any useful mineral which may serve as manure or fuel : And, 5. By promoting the introduction of any new branch of manufacture or trade, likely to promote the advantage of the district.

6. To form benevolent plans for the support and comfort of the members of the society, or their dependants.

By various means this has been effected : 1. By aiding and supporting such members of the society as stand in need of assistance. 2. By insuring their property, farm-buildings, stock, and crop, against accidents by fire. 3. By maintaining members when visited by sickness, infirmity, or age. 4. By providing for their widows and children : And, *lastly*, By supporting the servants of the members during sickness, when distinguished for their fidelity and long service, and providing for their widows and orphans.

The above classification includes the most important objects which have hitherto attracted the attention of the agricultural societies in Scotland. Though all these subjects have not been kept in view by any single association of this kind, yet in one or other of them these several particulars have been attended to *.

* To insure the cows of cottagers, is a material object, not hitherto attended to by any Scotch society. A plan for that purpose has been adopted in England, which is detailed in a communication to the Society for bettering the condition of the poor, (NO. 139), and of which the following is an abstract. 1. Every subscriber is to pay half yearly, for each cow, at the rate of one half-penny for every twenty shillings, upon her value per month. 2. No cow is to be admitted without the approbation and valuation of the commissioners of the district. 3. Upon the death of any cow so admitted, there shall be paid five-sixths of her estimated

SECT. IV.

THE RULES WHICH HAVE BEEN ADOPTED BY AGRICULTURAL SOCIETIES.

As the objects of such associations are so numerous, it is obvious, that their rules must also vary according to circumstances. Two or three examples will be sufficient, to exhibit a general view of the nature of such regulations. It is particularly advisable, that they should be few and perspicuous, as, in that case, they stand a better chance of being observed.

1. Rules of a Society for promoting the general interests of agriculture.

1. The society shall meet once every month excepting in time of harvest.
2. In the absence of the established president

value * ; in no case however exceeding L.12 ; her hide, tallow, &c. to be sold for the benefit of the fund. 4. Every subscriber neglecting to make his payments on the days appointed by the third article for that purpose, or within fourteen days after notice in writing from the treasurer of the district, shall be excluded. 5. All disputes shall be determined by the commissioner or commissioners of the district, subject to the controul of a general committee, to be elected hereafter from the whole circuit. And, 6. A treasurer, and a commissioner or commissioners, without stipend, shall be elected for each district within the circuit of the institution.

Such a plan is particularly entitled to the attention of the societies on the Borders. It would be greatly preferable to any box-clubs formed among the hinds or cottagers themselves.

* A certain proportion of her estimated value, (say five-sixths), is much better than fixing an absolute sum, as L.12, the first restriction operating to keep alive the cottager's interest in her preservation, or recovery ; and the latter to prevent his dealing in those animals with any other view than to their milk, &c. as a nutriment for his family.

or vice-presidents, each member shall act as preses or chairman in the order he stands on the list. 3. The secretary and treasurer shall be annually elected. 4. No new member to be admitted till one month after he has been proposed. His election to be by ballot, and at least two-thirds of the members present must vote for his admission. 5. Some subject connected with agriculture shall be discussed at each meeting, intimation of which shall be given at the preceding one, or the questions settled at the beginning of each year, that each member may be prepared. 6. All the members, whether ordinary or honorary, if resident, shall bear an equal share in contributing to the support of the funds, and expences of the society. 7. Each member shall have permission to bring one friend along with him to the meetings. 8. Each member shall have an engraved diploma *.

2. Rules of a benevolent Agricultural Society for the support of Labourers and Servants.

1. Every member must pay threepence *per* week, and must have contributed six months before he be entitled to relief. 2. No relief to be given till after the expiration of one week's confinement by sickness or accident. 3. If this sickness or accident be occasioned by drunkenness or irregularity, no relief shall be given. 4. Ten shillings *per* week to be allowed in cases of sickness, for the first twelve weeks : But, if prolonged farther, the allowance to be only seven shillings for other forty weeks, (if the member shall not sooner resume his employment), after which the amount shall be determined by the society. 5. Any member who has been dismissed from his master's service for dishonesty, shall be excluded from the society. 6. None to be admitted as members above 40 years of age, without a premium to be fixed by the society. 7. Members who refuse or neglect to pay their quota for

* In every agricultural society, the engraving of a diploma, as a bond of union, is one of the first objects that ought to be attended to.

three months in succession, to be excluded. 8. In case of the death of any member, the society becomes bound to pay L. 5 Sterling to his widow, for funeral charges, providing the funds amount to L. 100 ; if under that sum, two guineas and a half. 9. Every servant and labourer within the district, to become bound to be a member, otherwise to be dismissed by his employers. 10. The masters or employers to pay always three-tenths of the whole sum that should be contributed by the members. Lastly, When any labourer finds it necessary to leave the district, (unless dismissed for misconduct), he shall be considered still as a member, if he continues to pay his quota regularly.

*3. Rules of a Society for prosecuting Thieves, Robbers, &c *.*

1. That it shall be binding for seven years. 2. That a fund shall be raised, by annual subscription, for defraying the expence of apprehending, and prosecuting to conviction, any person or persons, suspected of murders, robberies, or any other kind of felonies, or petty thefts, committed on the persons or property of any of the subscribers to this association. 3. That the sums subscribed shall be regulated by the rent of the respective possessions of subscribers, and to be, for the ensuing year, at the rate of 2 s. 6 d. for each L. 100 Sterling : subscribers possessing less than L. 100 also to pay 2 s. 6 d. ; and subscribers possessing more than L. 50 above L. 100 to pay for an additional L. 100. 4. That any person of the description before mentioned, (*i. e.* proprietors and farmers), may, upon obtaining the consent of the committee and subscribing, be admitted a member of this association. 5. That A, B, &c. &c. or any five of them, be a committee for the ensuing year, to carry into execution the resolutions

* It is well observed in the West-Lothian Report, p. 231, that a society or body of men are less apt, than a single individual, to be moved by a mistaken clemency to the offender, or to be deterred from prosecuting him by the apprehension of trouble, or the dread of personal resentment, or inconvenient expence.

herein contained, and to transact every other necessary business of this association. 6. That in case any murder, robbery, or theft, shall at any time, during the continuance of this association, be committed on the persons or property of any of the hinds, herds, or other servants or cottagers belonging to subscribers, the committee shall carry on prosecutions at the expence of the association. 7. That for more effectually preventing any of the said crimes, if any member of this association shall, at any time during the said term, lodge, harbour, or conceal any person or persons suspected of being guilty of any of the crimes above mentioned, or any strolling vagrants, or other loose, idle, or disorderly persons, such subscriber shall, in that case, forfeit all right to the funds of the association, and shall no longer be considered as a member thereof. 8. That the committee shall have power to call a general meeting of subscribers at any time they may find necessary, to alter these, or to add new regulations, as may be thought proper; and any three members may call an extra meeting of the committee for the time. 9. That when any member of this association shall have any of his property stolen, he shall be allowed 3 s. *per* day, for each servant and horse employed in searching for the same, if they are not a night from home; and if they shall be one or more nights from home on that business, they shall be allowed 5 s. *per* day. These allowances to include every expence. 10. That any member having property stolen, may offer a reward of L. 5 Sterling, in the name of the association, to the person or persons who will discover the offender or offenders; and if the property stolen be sheep or horses, he may offer a reward of L. 20 Sterling. Lastly, That these resolutions be printed, and distributed in the different parishes of the county, in the hope of preventing any of the above crimes being committed, by convincing persons likely to offend, how improbable it is, that they shall escape the punishment due to them.

These are some useful specimens, out of many examples that might be given, of the rules adopted by such associations.

SECT. V.

OF THE ADVANTAGES THAT RESULT FROM AGRICULTURAL SOCIETIES.

THESE advantages are often slow; and may thence be imperceptible to superficial observers; but they are progressive, and ultimately will, under a proper system, become great and extensive. Their general nature, the following observations will explain.

1. When landholders engage in such associations, and take a concern in the general improvement of the country, it gives a powerful stimulus to the zeal and activity of the farmers; and furnishes the labourers with additional motives to diligence and fidelity *.

2. When landlords and tenants meet together in social intercourse, it is considered by the latter as a pledge of friendship and protection; and a useful spirit of emulation is excited, whilst proprietors and their tenants, compare together, over a social bowl, their exploits in farming, and the crops they can respectively produce †.

3. In remote parts of the country, such meetings are attended with peculiar advantages. They become a sort of agricultural festival, where the families of the members assemble from distant parts; where relations meet and renew their intimacy; and where friendships are formed and confirmed. The period of their future meetings is then looked forward to

* Dumfries-shire Report, p. 484.

† Ross-shire Report, p. 392-3.

with pleasure ; and amidst the innocent gratifications of social intercourse, the interests of agriculture, and the improvement of the country, are promoted.

4. There are many difficulties which would startle the most powerful individual, which vanish before the combined efforts of a numerous association, when it is possessed of information and influence, and funds adequate to the objects they undertake *.

5. The proceedings of a respectable association, have a great effect in liberalizing the minds of men, and in exciting all the members to reflection and exertion in the cause of improvement. By such means, plans of good management, useful practices, and other objects connected with the improvement of the country, come to be better understood and more generally extended.

6. When such a body of men act on a proper plan, and possess the combined powers of skill and influence, a knowledge of every useful fact, or new discovery, is speedily diffused ; and it is of incalculable importance, that such an association can speedily decide on the merits of any new suggestion ; and whether it be adapted to the particular district within the sphere of their influence, by subjecting it to actual experiments, which farmers will often be prevailed upon to undertake, (where a proper spirit is raised), and to report the result †.

In the last place, many benevolent results spring from such institutions. The aged and the infirm, the fatherless and the widow, who reap the happy fruits of such institutions, are living monuments of the inestimable advantages which flow from them.

* Ross-shire Report, p. 332-3.

† Dumfriesshire Report, p. 485.

SECT. VI.**ON THE MEANS OF ESTABLISHING AGRICULTURAL SOCIETIES ON A MORE ADVANTAGEOUS FOOTING.**

IF the above be a faithful, though concise account of the origin and progress,—the objects and regulations of Scotch Agricultural Societies,—and of the advantages resulting from such institutions, no liberal minded landlord can hesitate to countenance, and no tenant can refuse to concur, in establishing such plans. To promote such important purposes, and to extend the utility of such institutions, the following hints are suggested.

1. *An adequate fund ought to be raised for the support of such societies.*

It is of essential consequence, not merely to institute, but to provide the means of effectually supporting such associations. For want of this, many have failed of success, been cramped in all their operations, and ultimately dwindled into insignificance. To prevent this, it would be proper to establish a *permanent fund*, to which both landlord and tenant ought to contribute in proportion to the rent they receive or pay. If only 2s. in the L. 100 of rent, *per annum*, were allotted for this purpose, it would be sufficient ; for by the proper expenditure of such a sum, the improvement of an extensive district would be greatly accelerated.

2. *Every survey made by the Society of the particular district where it is established, should be regularly recorded in their minutes.*

By this means, it might serve as a register of the progress of agriculture ; and the longer it was continued, the more va-

luable and important would it become. It might be referred to by the members, as a proof of the progressive advances they have made in improvement. The greater that progress, the more interesting would these reports become.

3. *Every improvement in the art, or the implements of husbandry, ought also to be kept on record by the Society, where the discovery was first made.*

The origin and history of, and the several names of those who first suggested or improved, or brought the instrument or art to perfection, should be regularly entered.

This would not only prevent all future disputes as to the real inventor, but it would put it in the power of future ages, duly to appreciate his merit, and to do justice to his memory.

4. *An extensive correspondence between the Highland Society, and all the Agricultural Societies in Scotland, ought to be established; and the measures they respectively adopt for promoting improvement, ought to be in unison.*

The benefits that would result from the adoption of this plan, are incalculable; and, at the same time, so obvious, as not to require enumeration.

Lastly, some means should be devised, by which every Society, however remote, might carry on a correspondence with the Board of Agriculture.

That institution ought to be accounted as the centre of the circle; and every other society should be considered as the radii. It is the heart, the great receptacle of the blood: but they ought to be considered as the vessels through which that blood naturally flows. Hence, all improvements in the art of husbandry, or in the implements it uses, ought to be circulated, by means of the Board, throughout every branch of the united association. Agriculture would thus be rapidly brought to a degree of perfection, in this country, which could not otherwise be expected.

On the whole, agricultural associations cannot be too much encouraged. They favour that mutual communication of ideas, and excite that spirit of emulation, which are found highly advantageous to the other arts, and cannot be less so to husbandry. Indeed, farming may be said, in some respects, to need such aid, more than other arts, because it is more of a solitary employment. The cultivator of the soil is in a manner insulated upon his own fields; while persons employed in the greater part of mechanical operations, carry on their work in company, and are therefore irresistibly led to profit by each other's ingenuity or skill. To make up for this disadvantage on the part of the husbandman, it seems necessary, that he should occasionally meet with his brethren, in order to communicate his observations, and in his turn to receive the benefit of their experience*. This is the more necessary, as the experience of one individual is slow and defective, *and consequently is a most expensive mode of obtaining information*†; whereas the experience of numbers, when combined, is not only more rapid in its progress, but much more effective.

* East-Lothian Report, p. 241.

† Dumfries-shire Report, p. 484.

CONCLUSION

TO THE

GENERAL REPORT OF SCOTLAND.

GENERAL VIEW OF THE MEANS BY WHICH THE AGRICULTURAL
PROSPERITY OF A COUNTRY CAN BE PROMOTED.

BY SIR JOHN SINCLAIR.

"Agriculture is the great art, which every government ought to protect, every proprietor of land to practise, and every inquirer into nature to improve *."

FROM the information contained in the preceding chapters, the agricultural state, and political circumstances of Scotland, may be sufficiently understood. Nothing then remains, to complete the original plan of this work, but to lay before the reader, a general view of the means of promoting the agricultural prosperity of the country.

The foundation of that prosperity must certainly be laid, in a judicious system of civil policy ; and every obstacle to the progress of improvement, from whatever cause it may arise, ought, as much as possible, to be removed. But though, by these means, agriculture may be carried to a considerable extent, *yet it will never flourish in an eminent degree ; nor will*

* See "Some Thoughts on Agriculture, both Ancient and Modern ;" printed in the works of Dr Samuel Johnson, edit. 1806, by Murphy, vol. ii, p. 440.

a country, with an increasing population, ever become independent of foreign nations for subsistence, unless steps are taken, *by public encouragement*, to advance the progress of the art.

This leads to the most important discussion, perhaps in the whole range of political inquiry, and respecting which, the most ill-founded prejudices are unfortunately entertained, namely, “What public encouragements, for the advancement of agriculture, ought a wise government to bestow?”

Many able men, *who reason from the abuses to which the system of encouragement may be liable*, have thence been induced, to condemn this policy, and to recommend that of giving to individuals, the entire freedom of exercising their industry in their own way, without any legislative interference whatever. They dwell much on the reply once made by some of the principal merchants of France, to the celebrated Colbert, who having asked, *What government could do for them?* was answered, “*Laissez-nous faire,*” (*let us alone*). On the other hand, they totally reprobate *the mercantile system*, as they call it, (or a series of laws which have been enacted in this country for promoting the prosperity of commerce), as in the highest degree impolitic; though under that very system, the commerce of Great Britain has risen to a height altogether unexampled in history.—Our Legislature, however, after due consideration, having judged it expedient to protect both our manufactures and commerce, and both, under such a system, have so eminently flourished, no good reason can be assigned, why, in a like manner, and on the same principles, agriculture ought not to be encouraged in Great Britain, where it produces such a great revenue;—where, with 800 millions of debt, we still have above 20 millions of acres, lying in a state comparatively waste and unproductive,—where the population is rapidly increasing,—and where it has been found necessary, for some years past, to import a considerable portion of the means of our subsistence.

It is certainly better to let agriculture alone, than to establish injudicious regulations respecting it. But if a government will make such inquiries, as may enable it to judge of what can be done with safety and advantage; and will promote agricultural industry, not only by removing every obstacle to improvement, *but by granting positive encouragement*, agriculture will prosper with a rapidity, and will be carried on to an extent, which is hardly to be credited, and in a much superior degree than by the "let-alone system," under the torpor of which, ages might pass away without accomplishing, what might be effected, in the course of a few years, under a judicious system of encouraging regulations.

The principal encouragements which a wise and liberal government, will naturally be anxious to bestow, for the purpose of advancing the agricultural prosperity of a country, may be classed under the following heads; 1. To promote the collection and diffusion of useful information; 2. To give a preference to domestic productions in the home market; 3. To encourage the exportation of any surplus produce that may remain on hand, after the demands at home are supplied; 4. To promote, by every possible means, the cultivation of waste lands, in order that the productive territory of the country may be constantly on the increase; 5. To encourage substantial improvements, such as roads, bridges, canals, &c., on which the agricultural and general prosperity of a country essentially depend; and, 6. By countenancing the establishment of corporations, to furnish the means of carrying on improvements, which are beyond the power of individual wealth or enterprise, where the capital is sunk, but where considerable annual returns may be relied on.

1. *To promote the collection and diffusion of useful knowledge.*

This is an object which cannot be too strongly recommended, and to which, to a certain extent, the British Government has attended, by establishing a Board of Agriculture. Notwithstanding the limited means of that Institution, the

most distant parts of the country have already been made acquainted with each other's useful practices ; and the knowledge of beneficial inventions, which, from the insulated situations of farmers, might for centuries have been confined to the place of their origin, have, by the publication of County Reports *, or the medium of periodical publications, been at once rendered generally accessible. Animated by the example of that Board, a greater number of agricultural societies have been constituted, than ever was heard of before in any other country, there being hardly a county, or extensive district in the united kingdom, in which one, and sometimes more of such associations may not be found. A zeal for the improvement of husbandry, is thus cherished and kept up ; and in the course of friendly and familiar conversation, useful observations are made, new facts are stated, and practical knowledge, derived from experience, is generally diffused. Much good has already been done by these societies, but still more might be effected by them, were the Board of Agriculture placed on such an efficient footing, that it might act as a common centre to all these numerous associations. It would thus be enabled better than it is at present, to perform those public services, which were in the contemplation of those, by whose exertions the Board was originally established.

There are other means also, by which useful information may be either collected or diffused ; as, 1. The establishment of experimental farms ; 2. Of agricultural professorships ; and, 3. The improvement of veterinary knowledge.

Experimental farms.—The art of agriculture can never be brought to the highest degree of perfection, or established on rational and unerring principles, unless by means of experiments, accurately tried, and persevered in for some time.

* The publications of these reports was of peculiar importance, from the discussions which they occasioned ; the spirit of emulation which they excited ; the knowledge which they were the means of circulating ; the truths which they established ; and the errors which they contributed to overturn.

The ardent inquirer has too long been obliged to rely on vague opinions, and assertions which have not been warranted by sufficient authority; it is full time, therefore, by the establishment of experimental farms, under the sanction, and at the expence of government, to bring the art to as great perfection as possible, by ascertaining the principles on which it ought to be conducted.

It is alleged, that there are many distinguished characters, who carry on experiments for their own information and amusement, by the means of which, every important fact will in process of time be ascertained; and it cannot be doubted, that their example is of very great advantage to those who have the means of examining the progress they make. Their farms, however, are, more properly speaking, *pattern farms*, for the advantage of *their own immediate neighbourhood*, than experimental ones, in the strict sense of the word; and they are too often, rather the partial records of successful experiments, than the faithful and impartial journals both of success and of disappointment. In order to render experimental farms generally useful, they ought to be open to the inspection of the public; the account of each experiment ought to be regularly published, and every new practice, likely to improve the cultivation of any considerable part of the kingdom, ought to be examined with the utmost precision, every trial repeated for confirmation, and, if possible, made by different persons, in different places. It cannot be expected, that persons of high rank, whose attention is necessarily directed to other objects, should renounce their ordinary pursuits, and devote themselves exclusively to the conducting of agricultural experiments. Whereas, if one or more experimental farms were once established, it would soon be discovered, what practices ought to be avoided, as well as what ought to be pursued. It is important that the one should be made known as well as the other; yet *errors in husbandry* are seldom communicated to the public, or known beyond the sphere of confined neighbourhood, because a farmer is in ge-

neral ashamed of acknowledging his want of success. Unfortunately also, when his experiments answer, they are sometimes concealed, lest others should avail themselves of the discovery. The object of an experimental farm, however, should be, to ascertain facts, *and to publish them*; and as much credit would be acquired, by an intelligent conductor of an experimental farm, for his exertions in detecting errors, as in establishing facts likely to be useful.

It is surely no object to a country, possessing such an immense revenue, to lay out any moderate sum that may be necessary, were it only L. 5000 *per annum*, for ten or twenty years, to ascertain points of such essential importance, and which might be the means of making such great additions to the national produce, wealth and revenue *.

2. *Agricultural Professorships*.—It is only within these few years, and at the expence of a private individual, (the late Sir William Pulteney), that a professorship was established at Edinburgh, for reading lectures on the art of agriculture. The advantages of such an institution are so evident, from the success which has attended this plan, that it ought to be extended to all the other universities. The attention of young men is thus directed early, to this most useful of all the branches of knowledge, which has now become the general subject of conversation wherever they go. If they inherit landed property, agriculture is the topic to which their views should be particularly directed; and as there is scarcely any profession, which will preclude them from spending some part of their time in the country, and as at the close of life, they frequently become proprietors of land, their being possessed of such knowledge, therefore, would be a source of much gratification, and perhaps of advantage. For such establishments, no aid would be required from Parliament, but merely an act, suppressing those professorships which

* Cromwell gave L. 100 *per annum*, (a considerable sum in his time), to establish a Flemish farm in Hertfordshire, by means of which, the husbandry of that county became so celebrated.

at present are sinecures, or of little real utility, and establishing in their room, Professors of Agriculture.

3. *Improvement of veterinary knowledge.*—Some encouragement has been given, by an annual grant, to the acquisition and diffusion of veterinary knowledge, a deficiency in which had proved so fatal to the public interest. It is not improbable, that for every pound of public money that has been in this way expended, a thousand has been saved in our national expenditure, in the article of horses alone, employed in the cavalry and artillery. It would be desirable, indeed, that schools for veterinary knowledge should be established, in all the principal towns in the kingdom, and that the preservation of every species of our valuable stock of domestic animals, should be no longer left to ignorance or quackery, but that the practice in treating their disorders should be grounded on scientific principles.

2. *To give a preference to domestic agricultural productions in the home market.*

This is peculiarly necessary, both to preserve the country from famine, and to render it independent of other nations for the necessaries of life. To permit the industry of every foreign nation in the universe, at all times, and without any just limit, to enter into competition with our own domestic industry or productions, is a degree of infatuation, which can only arise, from the wildness of theoretic speculation, or the selfishness of commercial enterprise. If two nations, similarly circumstanced in regard to soil, climate, labour and circulation, were to give each other reciprocal liberty of trading, the system, on the whole, might not be materially injurious to either ; but to place in competition, the industry of one country, which has a great national debt, and heavy taxes, and where the price of labour must consequently be high, with that of an indefinite number of other countries, which, with better climates, and more fertile soils, are not subject to these disadvantages, would be infatuation in the extreme. Besides, no country that has

sufficient extent of surface, and can, by any exertion, produce food for itself, would act wisely, to allow itself to be dependent on others for subsistence.

The equitable principle, therefore, is, to impose a prohibitory duty, on all foreign agricultural productions, until their price be at least as high, as that at which they can be raised in Britain, in seasons of moderate fertility; and gradually to diminish that duty, as prices rise, but still giving a decided preference to the produce of the agriculture of the united kingdoms. Let us take one species of corn as an example. Some soils and climates are peculiarly adapted for the culture of wheat, where it can be raised at little expence, is not liable to disease, and is rarely injured during harvest. Such grain may always be procured at a lower rate, unless in very peculiar seasons, notwithstanding superior skill, industry, and capital, than wheat can be raised at in Britain, where heavy taxes are imposed, where the rate of labour is high, where rents are considerable, where the climate is unfavourable, and where the grain is liable to various disorders. If *universal competition* were admitted, and consequently the free importation of wheat were sanctioned by law, active and intelligent merchants, would discover where it would be procured the cheapest, and would bring it to the British market, to the injury of domestic cultivation. The free exportation and importation of grain, therefore, in justness and equity, can only take place between nations, where the value of money is the same, where they are subject to the same taxes, are similarly situated in regard to soil and climate, and live in amity with each other.

3. *To encourage the exportation of any surplus produce.*

It is likewise essential, to promote the exportation of domestic produce, if there be any redundancy, after supplying the demand at home. It is not sufficient to permit the exportation; it is farther necessary, for the encouragement of domestic cultivation, and in order that the articles grown at

home, may be enabled to meet the productions of other countries, in foreign markets, *on equal terms*, to give what is called a bounty on exportation. Nothing, however, can be more erroneous, than to give that encouragement the name of *bounty*, when it is in fact merely a *drawback*. The farmers at home, are subjected to a variety of taxes, which are not imposed on their foreign competitors. To enable them to meet, on equal terms, they are entitled to receive an allowance on every quarter of grain exported, equal to what they had actually paid to the public, under various denominations. It is but just that the government should repay the taxes it had received, on what is thus exported, to enable the farmers under its protection, to enter into a fair competition with foreign cultivation; more especially if the rates at which importation is allowed, are so fixed for the benefit of the manufacturers, that the corn-growers can, at no period, obtain great profits, the increased price being, in general, only a bare compensation for deficiency of produce.

4. *To promote the improvement of waste or unproductive Lands.*

It is of peculiar importance to a country, increasing in population, to be constantly adding to its productive territory. There are different ways by which that object may be promoted: 1. By facilitating the division, drainage, and improvement of commons, or intermixed lands; at least in all cases where two-thirds or three-fourths of the parties concerned, are in favour of any such measure; and this benefit might be made attainable by an act of the legislature, authorising an application to the Quarter Sessions in England, or Sheriffs in Scotland, to order an inspection and a report of the expence, &c. to be made, and after hearing parties, to decide on the propriety of the application. If then approved of, the direction and execution of the improvement should be remitted to commissioners; and, 2. By exempting from, or abating the taxes payable by farmers, where waste lands are

brought under cultivation, for a term of years, according to the expence of the improvement.

Some have also recommended bounties to the cultivator of waste lands, or that government should lend money, at a moderate interest, to promote that object; but if the plan for establishing corporations, to encourage beneficial improvements, *by loans*, in the manner afterwards suggested, is adopted, any measures of that sort, on the part of the public, will not be necessary.

On this subject it is only necessary to add, that unless the farmer is protected from the intrusion of foreign competition, the improvement of our waste lands must in a great measure be stopped; for it is impossible that the produce of our *barren soils*, cultivated at a great expence, can stand a competition with the produce of the *fertile fields* of other countries, where the expence of cultivation must, comparatively speaking, be inconsiderable.

5. *To encourage permanent and substantial improvements.*

The wealth and agricultural prosperity of a country, materially depends, on such great and substantial improvements being promoted, as 1. Roads and Bridges; 2. Canals; 3. Railways; 4. Harbours; and 5. Embankments; and where the aid of government cannot be given to such undertakings, the establishment of corporations, under the sanction of public authority, will often be found an advantageous mode of carrying such improvements into effect.

1. *Roads and Bridges*.—As the first means of introducing improvements into a country, roads and bridges are essential; and where the population is thin, and the country is poor, there is no possibility of having such communications made without public assistance. Two plans for that purpose have been adopted in making roads. By the one, the military have been employed in such public works; by the other, under the authority of commissioners appointed for that special purpose, the public has agreed, in the more remote parts of the

country, to advance one half of the expence of making roads and bridges, where the proprietors are at the other. The communications which have been opened, in consequence of this encouragement, are numerous, and the public will soon be amply indemnified, for any sum it has thus expended, by the increased revenue it will derive from districts, which have hitherto been unproductive.

In times of peace also, the military cannot be better employed, than in carrying on public works, of so useful a description, as roads, canals, &c. Unless when engaged in war, soldiers are the better for being employed: It strengthens their bodies, and occupies their minds. The remains of those roads which were constructed by the Roman armies, fully prove, what that intelligent nation considered to be the best means of preparing their soldiers in time of peace, for the hardships of war.

2. *Canals.*—The advantages of canals to agriculture need not be dwelt upon. They facilitate the means of conveying the bulky productions of the soil to market, and also of bringing, at a moderate expence, coal and lime, and other manures to the farmer. Under a proper system also, the surplus water might be usefully employed for the purposes of irrigation. On all these accounts, canals ought to be encouraged by the government of the country. It is not desirable, except in very particular cases, that they should be executed at the public expence; but it would greatly promote such useful undertakings, if government were to lend a certain sum to the proprietors of such canals, at a moderate interest, to enable them to complete any undertaking of that sort. This was done for the Forth and Clyde navigation, and the Company has since repaid the loan. The same plan might be successfully adopted in other instances.

3. *Railways.*—This new mode of conveyance is capable of being more extensively used than canals, and is well entitled to the encouragement of government, by loans of money, at a moderate interest, to carry them on. The more that com-

munication can be opened between one part of the kingdom and another, the more does a country prosper, and the more are the people in it combined into one great community. Railways would be particularly convenient, where canals are impracticable, for conveying timber from the interior of the country, to the sea-ports, and in particular to our marine arsenals.

4. *Harbours.*—Though harbours are of more consequence in a commercial, than in an agricultural point of view, yet they are still of material consequence to the husbandry of a country, by facilitating the exportation of bulky articles of produce, and the importation of coal and lime, those essential articles to the farmer. The same plan of public assistance, either in whole, or in part, will be found as useful in regard to harbours, as to railways or canals, and has answered in practice. Certain sums of money, (arising from the forfeited estates in Scotland), which were at the disposal of Parliament, were granted for improving harbours on the north-eastern coast of Scotland. The sums given were trifling, in general from two to four thousand pounds each; and, excepting in one instance, where the sum was granted to encourage a fishing establishment erected by a public spirited company, (the society for improving the sea-coasts of the kingdom), the inhabitants of the towns or neighbourhood where that assistance was bestowed, were bound to furnish one half of the total sum to be expended. The effect of this system is hardly to be credited. It is not so much indeed the sum actually given, *as the spirit which it excites*, that is of service; and when once such a spirit is roused, it is not confined to one object, but extends itself to others. Little causes thus produce great effects, and a moderate public expenditure of a few thousand pounds, may lay the foundation of an extensive fishery, or a great emporium of commerce, and may promote, at the same time, the agricultural prosperity of an extensive district.

5. *Embankments.*—When the difficulty and hazard of embanking a considerable tract of country, either against the overflowings of a lake or river, or the inroads of the sea, are considered, there is no public undertaking that seems better entitled to the encouragement of a wise government. Extensive tracts of fertile territory, may thus be acquired, greatly to the public advantage. The soil thus obtained, is generally of a nature peculiarly productive, and well adapted for agricultural purposes. To carry on such undertakings, at the public expence, might be hazardous: but when their utility and ultimate profit are sufficiently proved, by the evidence of intelligent engineers, to the conviction of parliament, it may be advisable for the legislature, in times of peace, to authorise the advancing one-third, or any other proportion, of the estimated expence, at a moderate interest.

Where extensive drainages are necessary, the same encouragement ought to be given.

6. *To promote the establishment of Corporations for carrying on beneficial improvements.*

Many of these improvements might be successfully promoted, *by the establishment of corporations* for carrying on one individual object *, the formation of which, ought to be particularly encouraged at the present moment, on the following account. When the war ceases, there will probably be an immense surplus capital, requiring profitable employment, much of which will be sent abroad, unless it can be laid out at home with advantage. Fortunately, this might be effected with much facility, by erecting public companies, for specific objects of improvement. Each company should be permitted to raise a capital adequate to the object in view. It should execute no work itself, (planting perhaps excepted), but should merely be permitted, to lend money at six *per cent*.

* The Bedford Level Corporation is an example of that sort in England.

- to all such landed proprietors as had any great improvement to execute, the company being bound, to see that the money was not misapplied, and then to be entitled to draw a perpetual income from the estate, to the amount of six *per cent* *. The sum advanced, never to be demandable, but the stock of the company to be transferable, like other public securities, which would answer equally well the purposes of those stockholders, who might wish to receive again the sums they had subscribed. Estates under the fetters of strict entail might thus be improved, which is not likely to be the case, to any great extent, under any other system. The surplus capital of the country, would thus be employed at home, *and embodied*, it may be said, with our own territory ; and the whole country would be improved in a manner, and to an extent, that might not otherwise be attainable.
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It was by encouraging such measures as these, that the most celebrated statesman of modern times, justly called Frederick the Great, (more from his attention to internal improvement than to foreign conquests), raised his dominions, notwithstanding the disadvantages of situation, soil, and climate, to that height of prosperity and power to which they attained during his reign. His practice was, to lay out about L. 300,000 Sterling *per annum*, in promoting agricultural improvements, which he considered, “ *as manure spread upon the ground, to secure an abundant harvest ;*” and in fact, instead of being impoverished by such liberal grants,

* It would not be just to compel the company to receive back the money lent, when interest became low, after it was advanced, to promote a beneficial improvement when interest was higher. The interest should remain a perpetual rent-charge on the estate, unless where the company voluntarily agrees to receive back the principal, which would be the case, if it could be laid out with equal advantage. In the Appendix, will be found the plan of a company for lending money at 4 *per cent*. provided the company shared in the profit of the improvement.

he thereby increased his revenues so much, that he was enabled to leave a treasure behind him, amounting to above L. 12,000,000 Sterling *. On the other hand, this country, owing partly to unfavourable seasons, partly to its increased population, but principally to its agricultural interests not being sufficiently encouraged, has been under the necessity, of transmitting to other nations, above 57 millions Sterling, in the space of twenty years, and no less a sum than 12 millions, *in one year*, to procure food for its inhabitants !

May these considerations be listened to by those who take an active part in conducting the government of this great empire ; and may some effectual steps be taken, by encouraging cultivation and improvement, in the manner above suggested, or by such other means as may be judged useful, not only to prevent, what is justly accounted the greatest of all possible calamities, scarcity or famine, but also to promote the permanent welfare and happiness of the people.

JOHN SINCLAIR.

Charlotte Square, Edinburgh, }
1. May 1814. }

* In the works of the celebrated Count de Hertsberg, a particular detail is given, of the measures taken by Frederick the Great, for promoting the agricultural prosperity of his dominions, and the particulars of all the immense sums bestowed by him for that purpose.

GENERAL REPORT

OF

SCOTLAND.

ADDENDA

TO

VOLUME THIRD.

STATISTICAL TABLES ;

OR

RESULT OF THE INQUIRIES REGARDING THE GEOGRAPHICAL, AGRICULTURAL, AND POLITICAL STATE OF SCOTLAND.

1. EXTENT.

		Square miles	
	Land.	Fresh-water lakes.	Totals.
1. Main land of Scotland,	25,520	494	26,014
2. Hebrides, - -	2,800	104	2,904
3. Orkney Islands, -	425	15	440
4. Zetland Isles, - -	855	25	880
	<hr/>	<hr/>	<hr/>
	29,600	638	30,238

2. CLIMATE.

East Coast.

		Days.
1. Average number of days of rain and snow, -	-	135
2. Fair weather, - - - - -	-	230
		<hr/>
		365

West Coast.

	Days.
1. Average number of days of rain and snow, -	205
2. Fair weather, - - - - -	160
	<hr/>
	365

Difference of fair weather in favour of the east coast, 70

3. WINDS.

East Coast.

	Days.
1. From the north, - - - - -	25
2. North-east, - - - - -	29
3. East, - - - - -	62
4. South-east, - - - - -	14
5. South, - - - - -	9
6. South-west, - - - - -	105
7. West, - - - - -	102
8. North-west, - - - - -	19
	<hr/>
	365

West Coast.

	Days.
1. Points from east to west by north, - -	197
2. From west to south, - - - - -	139
3. From south to east, - - - - -	29
	<hr/>
	365

4. THE MOST CELEBRATED MOUNTAINS IN EACH OF THE FOLLOWING COUNTIES, AND THEIR HEIGHT ABOVE THE LEVEL OF THE SEA.

	Feet.
1. Benevis, (Inverness-shire, the highest in Scotland),	4370
2. Benmacdounie, (Aberdeenshire), - -	4300
3. Cairngorum, (Banffshire), - - -	4060
4. Benlawers, Perthshire), - - -	3787
5. Benwyvis, (Ross-shire), - - -	3720

				Feet.
6. Cruachan, (Argyleshire),	-	-	-	3390
7. Lowthers, (Lanarkshire),	-	-	-	3150
8. Leadhills village, Lanarkshire, (the highest inhabited place in Scotland),	-	-	-	1564

5. PRINCIPAL RIVERS, AND THE EXTENT OF TERRITORY FROM WHICH THEY DERIVE THEIR WATERS.

					Square miles.
1. Tay,	-	-	-	-	2396
2. Tweed,	-	-	-	-	1870
3. Spey,	-	-	-	-	1300
4. Clyde,	-	-	-	-	1200
5. North Dee,	-	-	-	-	900
6. Ness,	-	-	-	-	850
7. Forth,	-	-	-	-	840
8. Lochy,	-	-	-	-	530
9. Nith,	-	-	-	-	504
10. Findhorn,	-	-	-	-	500

6. CELEBRATED LAKES, AND THE SIZE OF EACH.

					Square miles of surface.
1. Loch Lomond, (Dunbarton and Stirling)	-	-	-	-	45
2. Loch Awe, (Argyle),	-	-	-	-	30
3. Loch Ness, (Inverness)	-	-	-	-	30
4. Loch Shin, (Sutherland),	-	-	-	-	25
5. Loch Mari, (Ross),	-	-	-	-	24
6. Loch Tay, (Perth),	-	-	-	-	20
7. Loch Arkieg, (Inverness),	-	-	-	-	18
8. Loch Shiel, (Inverness),	-	-	-	-	16
9. Loch Lochy, (Inverness),	-	-	-	-	15
10. Loch Laggan, (Inverness),	-	-	-	-	12

7. STATE OF PROPERTY.

	Number of Proprietors.
1. Large properties, or estates above L.2000 of valued rent, or L. 2500 Sterling of real rent, -	396
2. Middling properties, or estates from L. 2000 to L. 500 of valued rent, or from L. 2500 to L. 625 of real rent, - - - - -	1077
3. Small properties, or estates under L. 500 of valued rent, or L. 625 of real rent, - - -	6181
4. Estates belonging to corporate bodies, -	144
Total number of proprietors in Scotland,	7798

8. PROPORTION OF SOIL CULTIVATED AND UNCULTIVATED.

	English acres.
1. Number of acres fully or partially cultivated,	5,043,050
2. Acres uncultivated, including woods and plantations, - - - - -	13,900,550
Total extent of Scotland in English acres,	18,943,600

9. EXTENT OF WOODS AND PLANTATIONS.

	English acres.
1. Extent of plantations, - - -	412,226
2. ————— natural woods, - - -	501,469
Total,	913,695

10. NATURE OF THE PRODUCTIVE SOILS IN SCOTLAND.

1. Sandy soils, - - - - -	263,771
2. Gravel, - - - - -	681,862
3. Improved mossy soils, - - -	411,096
4. Cold or inferior clays, - - -	510,265
5. Rich clays, - - - - -	987,070
6. Loams, - - - - -	1,869,193
7. Alluvial, haugh, or carse land, -	320,193
	5,043,450

11. NUMBER OF ACRES IN ONE YEAR, UNDER THE DIFFERENT CROPS, OR IN FALLOW.

	Acres.
1. Grass, (in hay and pasture),	2,489,725
2. Wheat,	140,095
3. Barley,	280,193
4. Oats,	1,260,362
5. Rye,	500
6. Beans and peas,	118,000
7. Potatoes,	80,000
8. Turnips,	407,125
9. Flax,	16,500
10. Fallow,	218,950
11. Gardens and orchards,	32,000
	<hr/>
	5,043,450

12. VALUE OF CROPS.

	Acres.	Per acre.	Amount.
1. Grass lands,	2,489,725 at	L. 2,	L. 4,979,450
2. Wheat,	140,095 at	11,	1,541,045
3. Barley,	280,193 at	8,	2,241,544
4. Oats,	1,260,362 at	7,	8,822,534
5. Rye,	500 at	6,	3,000
6. Beans and peas,	118,000 at	6,	708,000
7. Potatoes,	80,000 at	8,	640,000
8. Turnips,	407,125 at	4,	1,628,500
9. Flax,	16,500 at	8,	132,000
10. Gardens,	32,000 at	15,	480,000

Productive acres,	4,824,500	Produce,	L. 21,176,073
Fallow,	218,950		

Total cultivated, 5,043,450 ; average *per* acre, (including fallow), L. 4, 4s. nearly.

Carry forward,	L. 21,176,073
----------------	---------------

Brought forward,	L. 21,176,073	0	0
Uncultivated 13,900,550, including			
wood lands, 3s. <i>per</i> acre,	-	2,085,082	10 0
<hr/>			
Total land produce,	-	L. 23,261,155	10 0

13. LIVE-STOCK, AND THEIR PRODUCE.

1. Horses, 243,489, value of their work when full grown, or increase in their work while young, yearly, at L. 10 each, - - - L. 2,434,890
2. Cattle, 1,047,142, annual value of dairy produce, and annual increase in the worth of the feeding cattle, at L. 6 each, 6,282,852
3. Sheep, 2,850,867, - - - 1,425,983
4. Hogs, 500,000, produce 30s. each, - 750,000
5. Lesser stock, (poultry, &c.) - - - 250,000

Total produce of live stock, - L. 11,143,725

This sum is included in the general estimate of land produce already given.

14. MINERAL STATE.

Coal.

	Acres
1. Extent of the great coal-field of Scotland,	600,000
2. Annual consumption, - - -	172
3. Quantity annually consumed in tons, -	2,500,000
4. Value of the coal annually consumed, at an average of 6 s. 8 d. <i>per</i> ton,	L. 833,333 0 0
5. Expence of labour 5s. 10d. <i>per</i> ton,	729,166 10 0
6. Rent to the proprietor, 10d. <i>per</i> ditto,	104,060 10 0

STATISTICAL TABLES.

Lime.

	Bolls.
1. Quantity of lime annually manufactured in Scotland, - - -	3,000,000
2. Quantity in Winchester bushels, at 4 bushels per boll, - - -	12,000,000
3. Value at 2 s. 6 d. per boll, - - -	L. 375,000
	Acres.
4. Extent of land annually dressed with lime, - - -	100,000

Iron.

1. Number of blast furnaces, - - -	21
2. Quantity annually produced, - - -	32,760
3. Value at L. 7 per ton, - - -	L. 229,320
4. Number of persons annually employed, - - -	7,650

Lead.

1. Number of bars of lead annually produced, - - -	65,000
2. Annual value at L. 2 per bar, - - -	L. 130,000

Value of Mineral Productions.

1. Coal, - - - - -	L. 833,333
2. Lime, - - - - -	375,000
3. Iron, - - - - -	229,320
4. Lead, - - - - -	130,000
5. Various articles, - - - - -	30,000
	<hr/>
	L. 1,597,653

15. FISHERIES.

1. Salmon and fresh-water fisheries, - - -	L. 150,000
2. The white-sea fishery, - - -	400,000
3. The herring fishery, - - -	500,000
4. The whale fishery, - - -	200,000
5. Shell fish, - - - - -	50,000
	<hr/>
	L. 1,300,000

16. AMOUNT OF TERRITORIAL PRODUCTIONS.

1. Gross produce of land,	-	L. 23,261,155	10	0
2. Minerals,	- - -	1,597,653	0	0
3. Fisheries,	- - -	1,300,000	0	0
<hr/>				
		L. 26,158,808	10	0
4. The rents of lands, mines, fisheries, kelp, &c. for one year ending 5th April 1813,	- - -	5,041,779	11	11
5. Amount of produce absorbed by the expence of cultivation, and the profit of farmers, gardeners, and other deal- ers in the productions of the soil, al- so by colliers, fishermen, &c.		L. 21,117,028	18	1

17. MANUFACTURES OF SCOTLAND.

	Value of raw material.	Total value of manu- factured articles.	Expence of la- bour and profit.
1. Woollen,	300,000	450,000	150,000
2. Linen, -	834,149	1,775,000	940,851
3. Cotton,	1,832,124	6,964,486	5,132,362
4. Inferior branches,	1,300,000	5,000,000	3,700,000
	<hr/>	<hr/>	<hr/>
	4,266,273	14,189,486	9,923,213

18. COMMERCE.

1. Number of ships belonging to Scotland,	-	2,708
2. Tonnage,	- - -	231,273
3. Number of seamen,	- - -	16,300
4. Exports,	- - -	L. 4,740,239
5. Imports,	- - -	3,671,158
<hr/>		
6. Balance in favour of Scotland,	-	L. 1,069,081

19. THE POOR.

1. Number of parochial poor,	-	-	36,000
Average allowance to each,	-	-	L. 3
<hr/>			
Total expence,	-	-	L. 108,000
Average expence of maintaining the poor			
in workhouses,	-	-	L. 8, 10 s.

20. POPULATION.

	Year.	Number.	Increase.
1. Population,	1755	1,265,380	
2. Ditto,	1799	1,526,492	261,112
3. Ditto,	1801	1,599,068	72,576
4. Ditto,	1811	1,804,864	205,796

The average population of Scotland is at the rate of 60 persons *per* square mile.

21. PEERAGE OF SCOTLAND.

1. Number of Peers at the Union,	-	-	154
2. The Duke of Rothesay when entitled to vote,	-	-	1
3. Claims admitted by the House of Peers after the Union,			4
<hr/>			
			159
4. Extinct,	-	-	41
5. Merged in, or united to, other titles,	-	-	10
6. Forfeited,	-	-	26
<hr/>			
			77
<hr/>			
		Remained,	82

22. STATE OF THE PEERAGE AT THE LAST ELECTION.

1. Peers who voted,	-	-	-	52
2. Minors,	-	-	-	3
3. Peeresses,	-	-	-	3
4. Roman Catholics,	-	-	-	2
				—
			Total disqualified,	8
5. Out of the kingdom, or who declined voting,				22
				—
				30
				—
			Total Peers,	82
				—

23. REPRESENTATION OF THE LANDED INTEREST.

1. Number of representatives,	-	-	30
2. Number of freeholders in the 33 Scotch counties,			2,429
3. Number of landholders entitled to vote, if the whole valued rent of the kingdom were held by persons, each possessing L. 400 Scotch of valued rent,	-	-	9,511

24. BOROUGH REPRESENTATION.

1. Number of representatives,	-	-	15
2. Number of boroughs,	-	-	65
3. Population of ditto,	-	-	471,417

25. ECCLESIASTICAL STATE OF SCOTLAND.

1. Number of synods *,	-	-	16
2. Number of presbyteries,	-	-	78
3. Number of parishes,	-	-	893
4. Number of established clergymen,	-	-	938

* Including the presbytery of Zetland, which is invested with synodical powers.

26. RELIGIOUS PERSUASIONS.

1. Established Presbyterian Church,	-	1,408,388
2. Seceders from the Established Church of various descriptions, but all holding presbyterian principles,	- - -	256,000
Total Presbyterians,		1,664,388
3. Separatists of various persuasions, as Baptists, Bereans, Glassites,	-	50,000
4. Roman Catholics,	- -	50,000
5. Scotch Episcopalians,	-	28,000
6. Methodists,	- -	9,000
7. Church of England,	-	4,000
8. Quakers,	- - -	300
		141,300
		1,805,688

27. REVENUE OF SCOTLAND.

1. Revenue at the Union 1707,	-	L. 110,694
2. Additional taxes then imposed,	-	49,306
Total revenue at the Union,		L. 160,000
3. Revenue of Scotland, <i>anno</i> 1813,	L. 4,843,229	12 11
4. Expence of management, drawbacks, &c.	- - -	639,132 5 2
5. Net revenue of Scotland,	-	L. 4,204,097 7 9
6. Increase since the Union,	-	4,044,097 7 9

28. PROPERTY TAX PAID BY SCOTLAND.

	On lands, mines, &c.			On houses.			Totals.		
	L.	s.	d.	L.	s.	d.	L.	s.	d.
Gross rental on 5th April 1811,	4,792,842	13	2	1,158,777	7	4	5,951,620	0	6
Ditto on 5th April 1813,	5,041,779	11	11	1,243,609	9	3	6,285,389	1	2
Increase in two years.							333,769	0	8

The reader will easily perceive, that in some of the above tables, it is only possible *to approximate to the truth*; and that in several other cases, there must be a perpetual fluctuation. But every exertion has been made, to render them as correct, as possible, and to give, within a moderate compass, a general view of the geographical, agricultural, and political circumstances of Scotland.

On the whole, it appears, that Scotland is a valuable and flourishing portion of the British Empire; and from the intelligence, skill and industry of its inhabitants, it is daily increasing in prosperity and wealth.

EXPLANATION
OF THE
ANNEXED ENGRAVING,
ENTITLED,
THE PYRAMID OF STATISTICAL INQUIRY.

BY SIR JOHN SINCLAIR.

THE object of the annexed engraving is, to explain the nature of a new system, "*That of making extensive inquiries the basis of condensed information ;*" by means of which, the information and talents of numbers of intelligent individuals, may be combined in the formation of one great work; and *useful knowledge*, the real source of national prosperity, may not only be rendered more complete, but, when ultimately brought within a moderate compass, may become more generally accessible.

The first practical illustration of that system, in its perfect state, is now given, in THE GENERAL REPORT OF SCOTLAND.

1. It was "*The Statistical Account of Scotland,*" a work which furnishes an accurate description of *every parochial district* in that part of the United Kingdom, amounting in all to 893, which laid the foundation of that laborious undertaking.

2. To procure detailed accounts of the agricultural state, and political circumstances, of the several "*counties or larger divisions,*" of which there are 33 in all, was the next step taken in the progress of the work.

3. But the great difficulty still remained, that of condensing, within a moderate compass, a mass of information, contained in fifty large volumes octavo, closely printed.

That, however, is now happily accomplished in this General Report, which, though reduced to three volumes octavo, with two of Appendix, yet comprehends the substance of all the information collected in the former publications. With such a work to consult, a British Statesman, is enabled to form as just an idea, of the general circumstances of Scotland, and the means of its improvement, as a proprietor usually acquires regarding his own private estate.—By adopting the same plan, in regard to England, Wales, and Ireland, what advantages might not accrue to those countries?

The practicability of carrying this system into effect being thus ascertained,—instead of its being restricted to agricultural or political topics, it ought to be extended to every other branch of useful knowledge. By minute inquiries, many valuable facts and observations might be collected, which would otherwise be lost; and by adopting the plan of condensation afterwards, more advantage would be derived from the information thus acquired, than could be obtained from undigested loads of literature.

IN ITS PRESENT STATE, KNOWLEDGE MAY BE COMPARED TO A SMALL PORTION OF GOLD, DISPERSED THROUGHOUT A GREAT QUANTITY OF ORE.—IN THAT RUDE CONDITION, THE STRONGEST MAN CANNOT BEAR ITS WEIGHT, NOR CAN ANY BENEFIT BE DERIVED FROM IT: BUT IF THE PURE METAL WERE SEPARATED FROM THE DROSS, EVEN A CHILD MIGHT CARRY IT WITHOUT DIFFICULTY, AND IT MAY BE USED WITH ADVANTAGE.

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